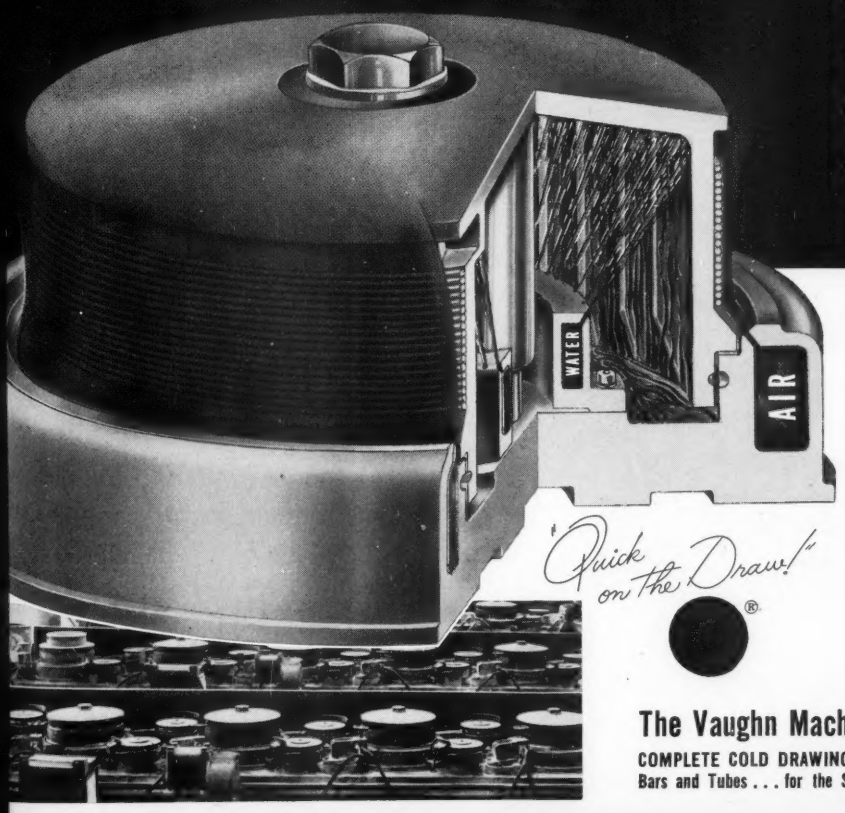
Vaughn® MOTOBLOC® MOTOBLOX®

with AIR and WATER

for perfect wire condition from start to finish!



Vaughn **DOUBLE-COOLED** blocks insure desirable temperatures for high carbon wire all the way through the draw—thanks to advanced engineering that provides *both* air and water cooling. Each block is equipped with an annular air blast for external cooling of the wire, while water jets impinging on the inner finned block walls remove heat continuously and effectively. • *Let us discuss the benefits to your wire on your operation!*

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in fibre

or steel

whichever is best for you

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The Payoffpak system is the easiest, cheapest way to pack, ship, store and use wire. Make it yours—in fibre or steel, or both.

ONLY CONTINENTAL GIVES THIS CHOICE OF PACKAGING FOR WIRE

Now you can use the Payoffpak system of loading and shipping wire . . . and, for smaller units, you can choose a fibre or a steel package, whichever best meets your requirements. Our steel Payoffpak pails give airtight protection, have sturdy bails and necked-in bottoms for secure stacking. Along with rugged construction, our fibre Payoffpaks offer the economy that goes with light weight. Smaller size has handy handles. Also available in various larger sizes.

With Payoffpak, wire is loaded directly into the shipping container as it is drawn or coated . . . laborious operations of splitting, tying and wrapping are eliminated. Payoffpaks can be beautifully decorated to become a traveling advertisement for you.

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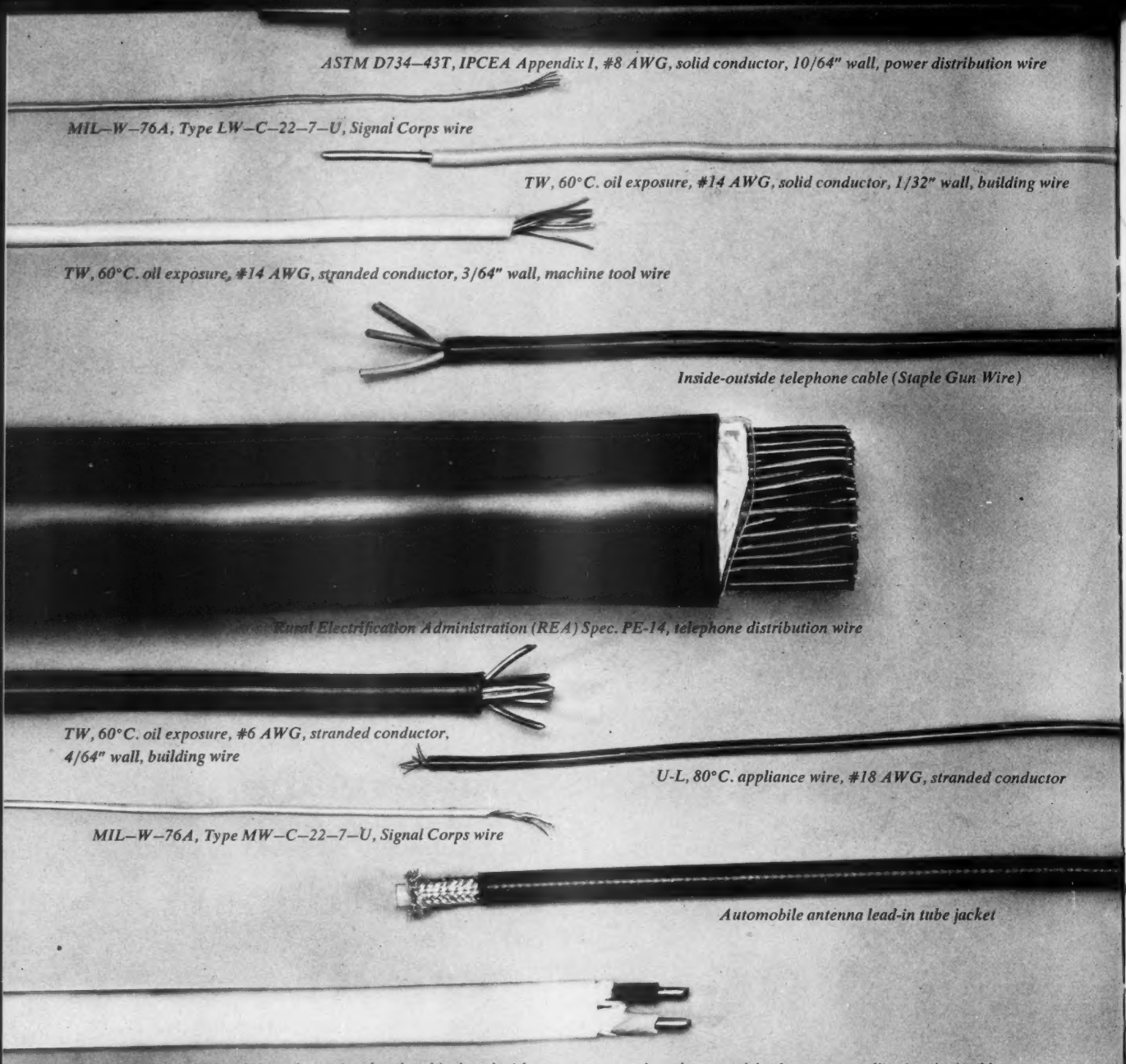
ASTM D734–43T, IPCEA Appendix I, #8 AWG, solid conductor, 10/64" wall, power distribution wire
MIL–W–76A, Type LW–C–22–7–U, Signal Corps wire
TW, 60°C. oil exposure, #14 AWG, solid conductor, 1/32" wall, building wire
TW, 60°C. oil exposure, #14 AWG, stranded conductor, 3/64" wall, machine tool wire
Inside-outside telephone cable (Staple Gun Wire)
Rural Electrification Administration (REA) Spec. PE-14, telephone distribution wire
TW, 60°C. oil exposure, #6 AWG, stranded conductor, 4/64" wall, building wire
U-L, 80°C. appliance wire, #18 AWG, stranded conductor
MIL–W–76A, Type MW–C–22–7–U, Signal Corps wire
Automobile antenna lead-in tube jacket
UF-NMC, 10/2 AWG, solid conductor insulated and jacketed with same compound, underground-feeder, non-metallic sheathed cable

One vinyl compound for all–versatile OPALON* 1038

Remarkable physical and electrical properties qualify OPALON 1038 for scores of uses

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A unique combination of high insulating efficiency, excellent heat resistance and extreme toughness is responsible for the all-purpose versatility of Monsanto Opalon 1038 vinyl compound.

Opalon 1038 is widely used for U-L Type T, TW and exposure to oil at 60° C., as well as for U-L 80° C. appliance wire.

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Rugged physical properties, including weather resistance and flame resistance, also qualify Opalon 1038 for insulating large-sized building wire (#6 AWG and over) and for cable jacketing.

All these applications have won appropriate recognitions from U-L, IPCEA, REA and Government agencies. For data sheets and complete information, write Monsanto Chemical Company, Plastics Division, Room 1124, Springfield 2, Mass.

MONSANTO

*OPALON: REG. U. S. PAT. OFF.

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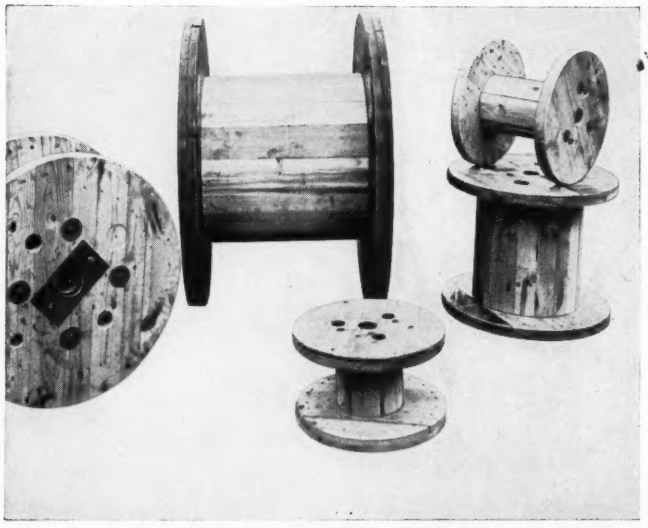
WOOD shipping REELS...

for all sizes and types of Electric Wire and Cable



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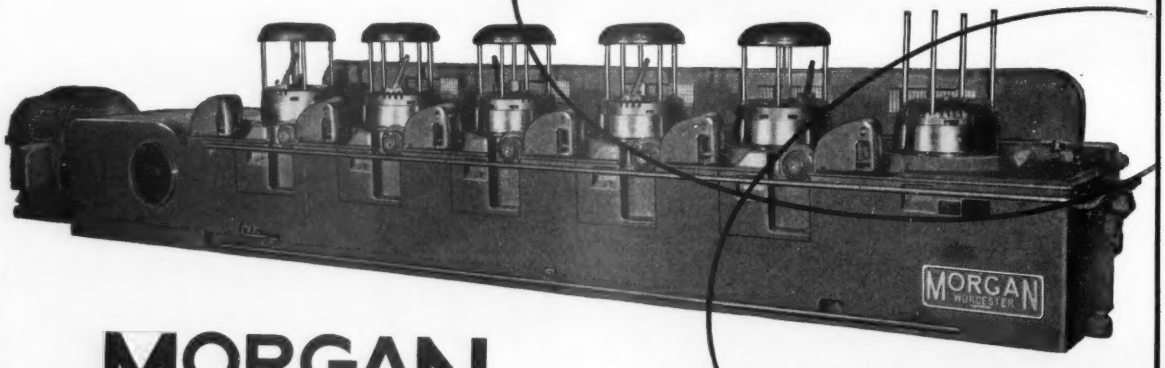

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WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 31 September, 1956 No. 9

Designated as Official Publication By The Wire Association

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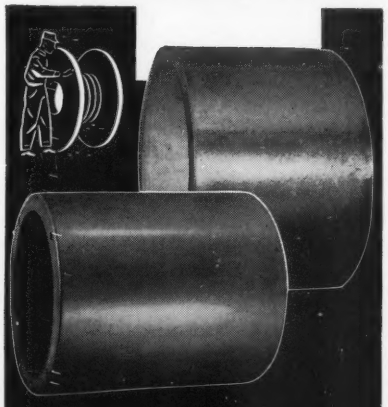

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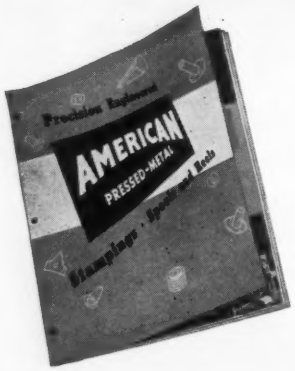

Send for your free copy of our latest bulletin on American Pressed-Metal Spools and Reels. It contains full details and charts on the many standard types.

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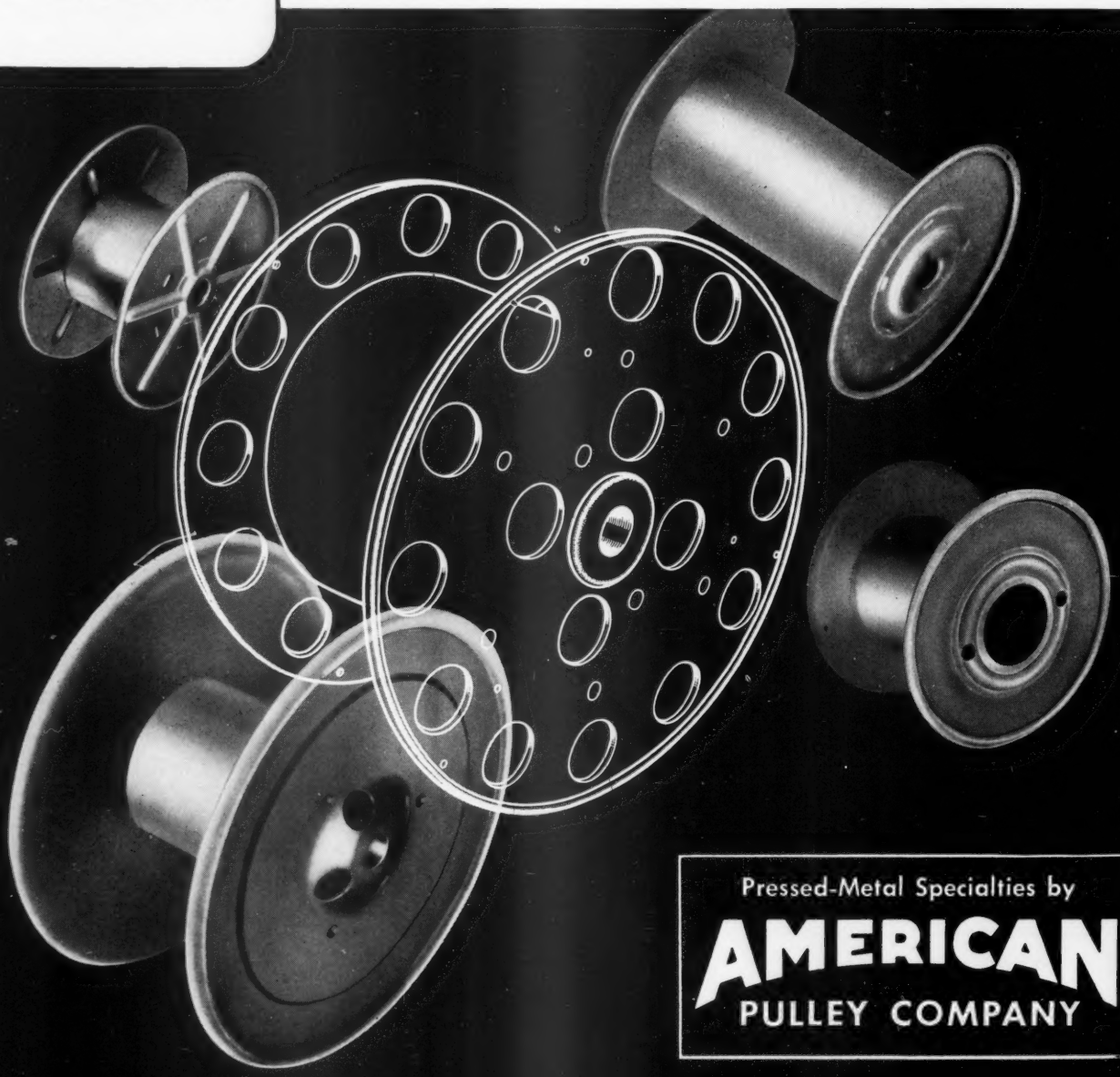

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is *Setting the Pace* in the Wire Machinery Field

Our new, energetic management has made great strides in rejuvenating our production and sales operations. Now . . . more than ever before . . . we are prepared to provide the wire industry with the type of service modern requirements demand.

Here is Our Progress Report

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  A new Dual Reel Take-Up
  A retest Unit for the Signal Corps

- **We have Modernized Our Research Department**
  Our staff of 18 consulting engineers are at your service . . . ready and able to solve your engineering problems.

- **We have completely Re-Organized Our Facilities**
  Our production facilities now encompass 97,000 square feet of working area. Our plant is now operating on a schedule of 1,200 man hours per day.

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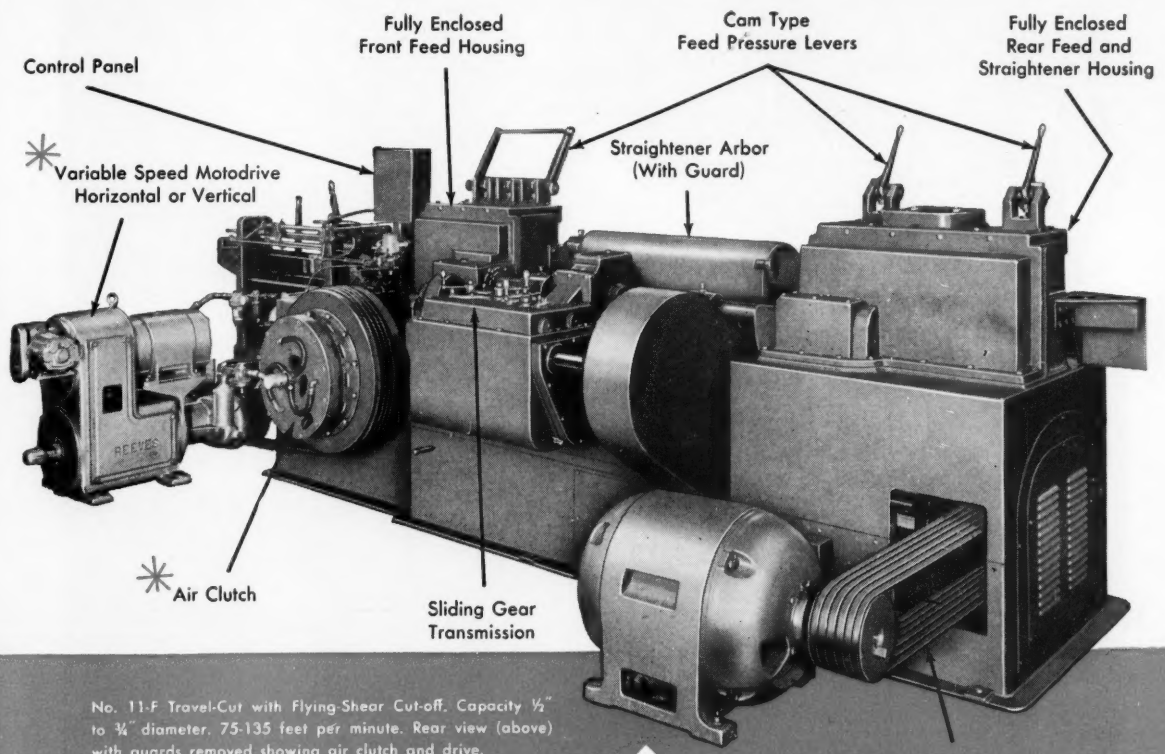
- Lewis engineers have added three
speed for perfect synchronization of



No. 11-F Travel-Cut with Flying-Shear Cut-off. Capacity ½" to ¼" diameter. 75-135 feet per minute. Rear view (above) with guards removed showing air clutch and drive.

famous Travel-Cut Machines for BETTER QUALITY CONTROL ...These machines are already in service in America's leading steel and wire mills.

✳ Wichita Air Clutch permits higher cut-off speeds, eliminates shock of conventional clutch. No adjustment necessary ...automatically compensates for wear.

✳ Wichita Air Brake eliminates conventional mechanical drag brake and is only engaged for a short portion of the cut-off cycle.

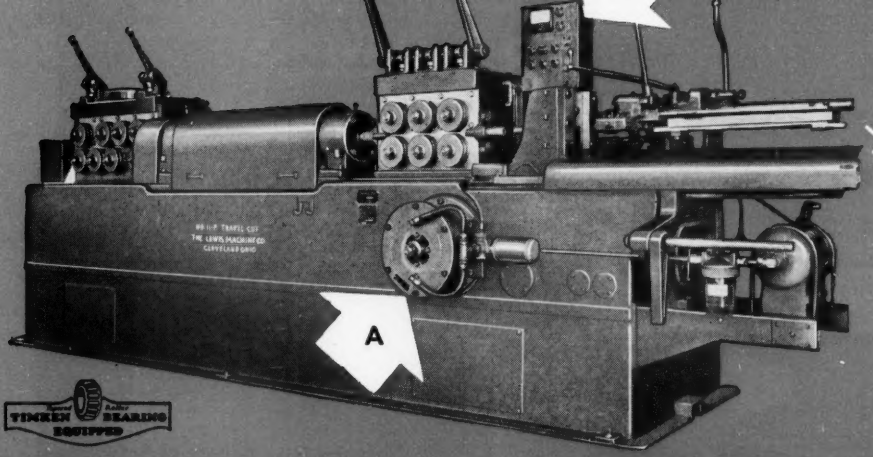
✳ Reeves Variable Speed Motodrive permits infinite adjustment of flywheel

unique arrangement makes possible the cutting of rod WITHOUT SPOT SWELL ...allows finer adjustment for cutting short lengths. Dial tachometer registers flywheel speed.

There are Standard Lewis Travel-Cut or Stationary-Cut Machines designed to straighten and cut all materials and shapes in wire or rod from .012" to ¾" at a wide range of feed speeds.

Be sure to see our new Air Clutch equipped machine in operation at the Metal Show in Cleveland, October 8-12, Booth No. 2002.

New illustrated brochure on request.



Front view of No. 11-F Travel-Cut with Flying Shear Cut-off showing Air Brake "A" (with guard removed) and operating panel "B" with push-button controls for Air Clutch, Reeves Motodrive and flywheel speed Indicator Tachometer.

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These and other outstanding J. L. Clark wire spool features are part of an integrated service that includes creative design, lithographic decoration, and special fabrication. Find out today how Clark's experienced staff of specialists can work with you in developing and designing colorful, sales-winning spools. Your inquiry will receive prompt and individual attention from a Clark sales representative. *J. L. Clark Manufacturing Co., Home Office and Plant, Rockford, Illinois; Liberty Division Plant and Sales, Lancaster, Pennsylvania; New York Sales Office, Chrysler Building, New York 17, New York.*

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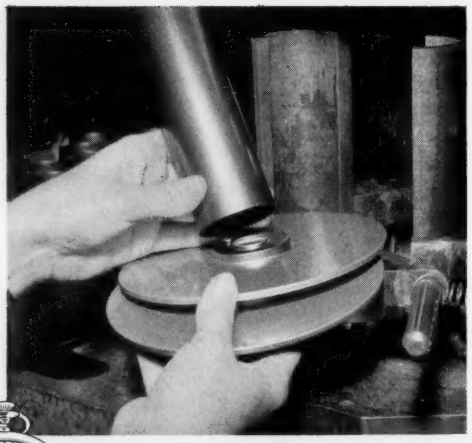
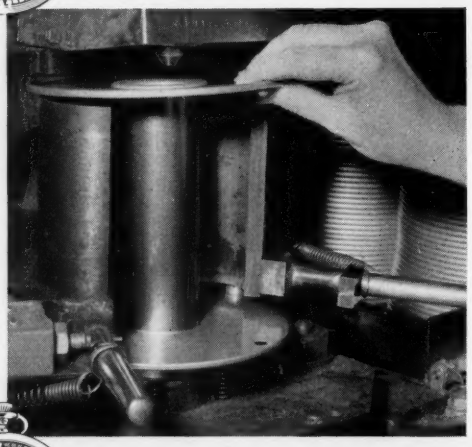
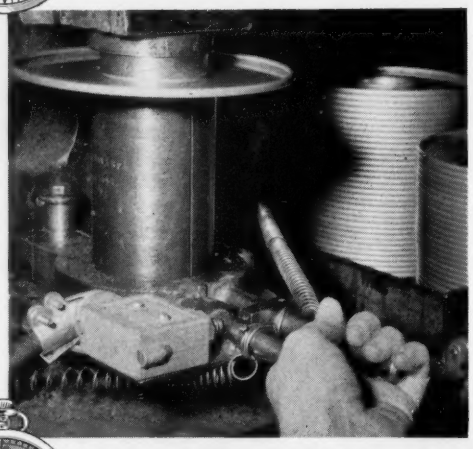
Lithographed Metal Containers



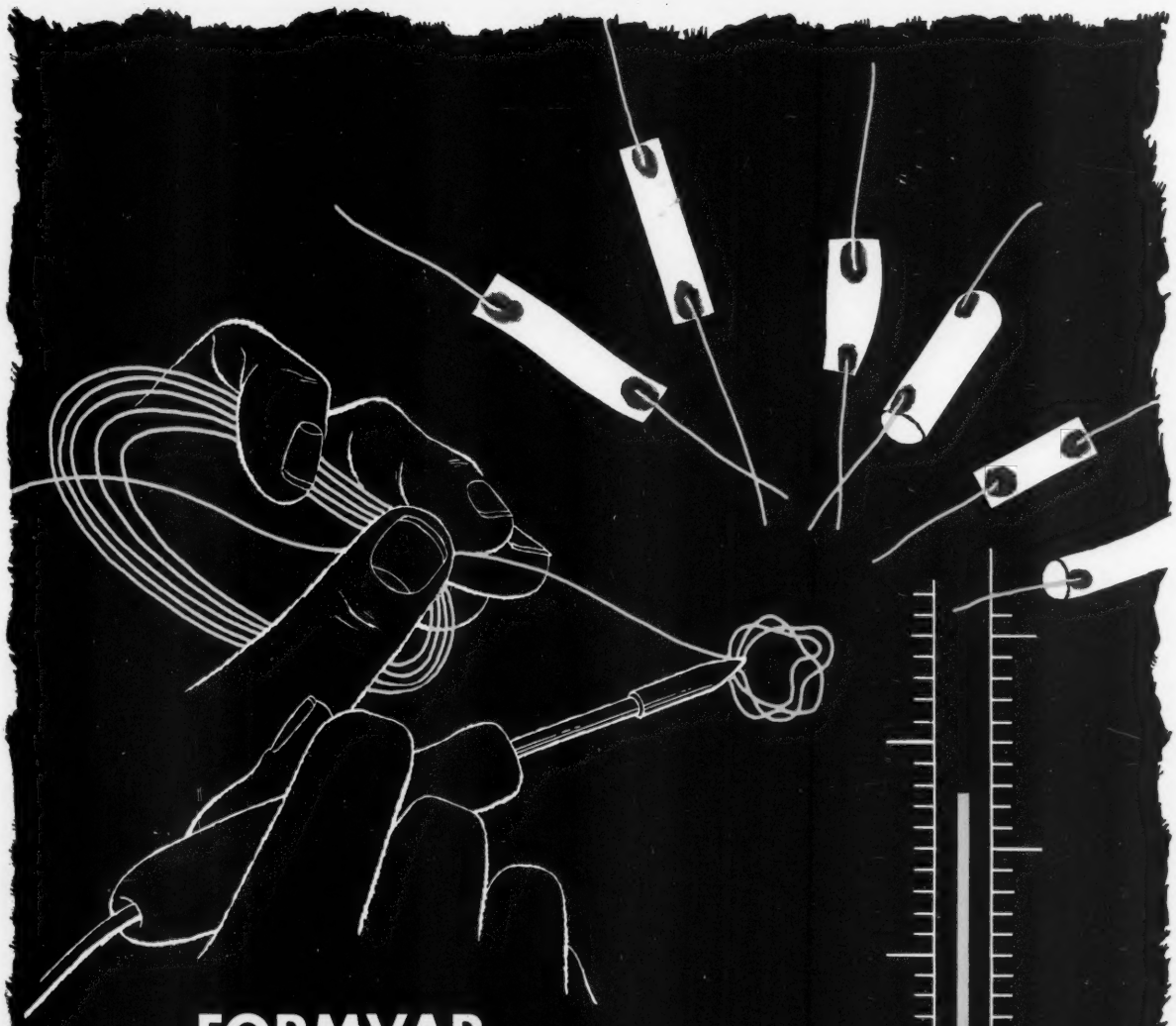
Operator picks up head . . . places arbor opening in stub of assembling die.
(TIME: 3 SECONDS)



Center is placed on head; other head is placed on center.
(TIME: 3 SECONDS)



Jaws of assembling die are closed, press is tripped (or kicked), spool is completely assembled. (TIME: 2½ SECONDS. TOTAL ASSEMBLY TIME: 8½ SECONDS)



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with low temperature solderability

FORMVAR has now been evaluated in combination with isocyanates and their derivatives. These new compositions provide wire enamels of exceptional performance in low temperature solderability. The new coatings, called Formvar urethanes, meet all the rigorous specifications of the magnet wire industry and compare favorably with the familiar Formvar phenolic in electrical properties, resistance to thermoplastic flow, and resistance to heat and water. Application procedures are the same as those used with Formvar phenolic.

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4 CAN BE SUBMERGED IN WATER

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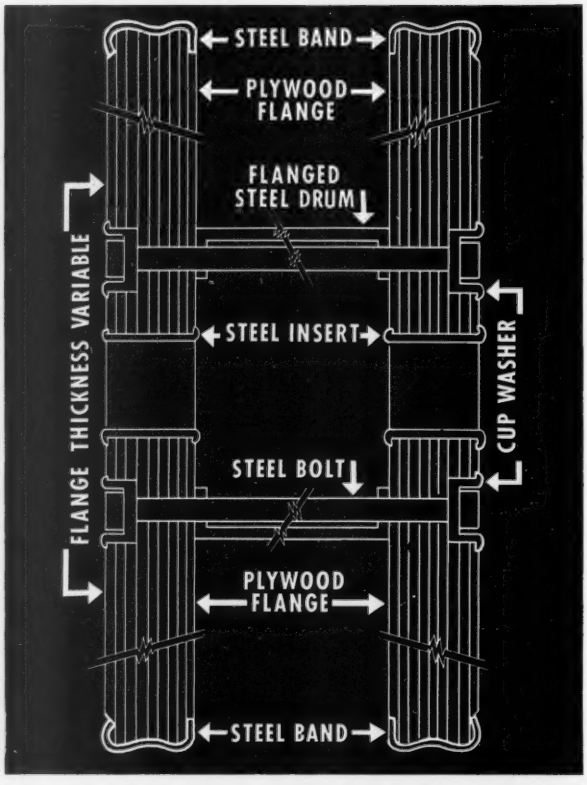

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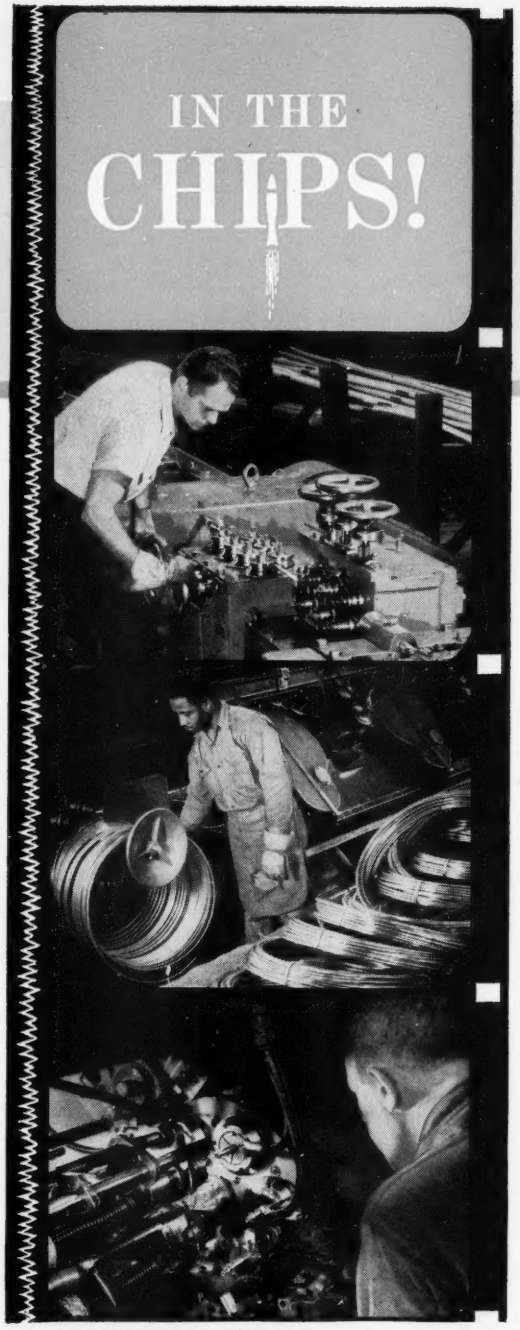

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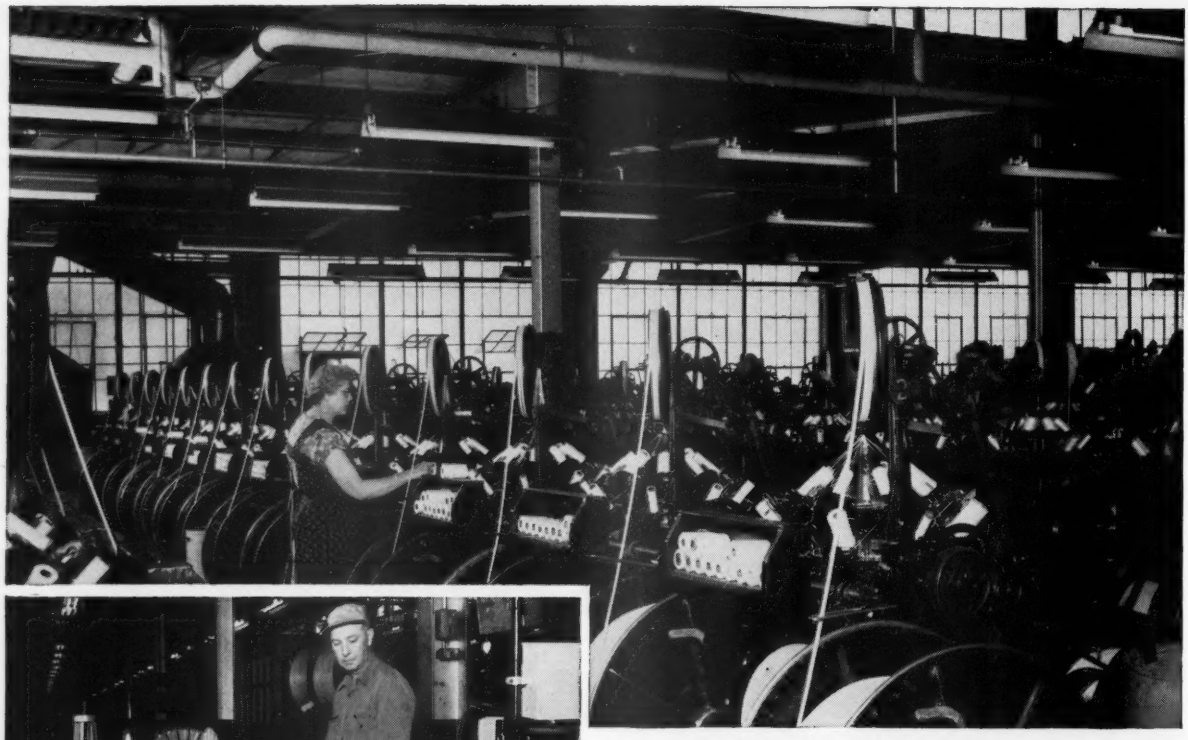

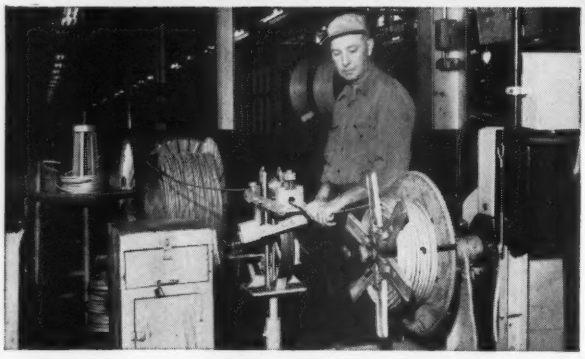

Anaconda braids Pittsburgh Fiber Glass Yarns on these machines. Breaking and snapping on spindles has been reduced 50% with this fiber glass.

Anaconda worker unwinds 8,000-ft. reel of conductor with a Pittsburgh Fiber Glass cover. Cable will be cut into 250-ft. lengths and boxed for shipment.

Pittsburgh Fiber Glass gives wire manufacturers 10 big advantages

Proof of the superiority of Pittsburgh Fiber Glass yarn over other types of materials in the manufacture of wire and cable covers is reported by the wire manufacturers themselves. Companies such as Anaconda Wire and Cable Company, which makes over 3,000 types of wire and cable at Marion, Indiana, use Pittsburgh Fiber Glass on many of their products with excellent results.

User reports show you, too, can benefit 10 ways!

1. Get 10% increase in production speed over other materials.
2. Fiber Glass is 50% less expensive for saturates.
3. Get twice the footage per spindle.
4. Fiber Glass has 300% greater tensile strength than other cover material.
5. It is highly resistant to chemical attack.
6. It can withstand temperatures up to 400 F.
7. There is less danger of 'wick-backs' along the cable.
8. There is a reduction in 'blow out' potential.
9. 50% less breaking or snapping on the spindles.
10. Fiber Glass eliminates 90% of the lint problems.

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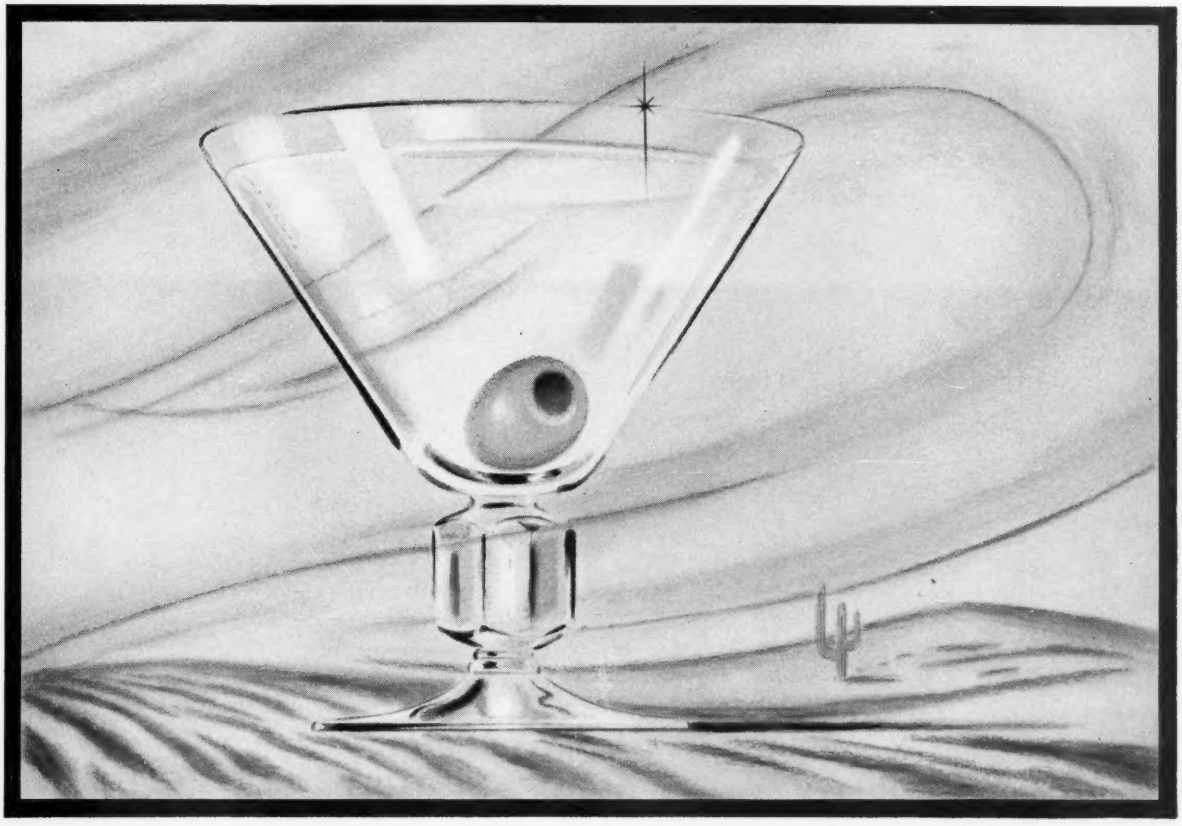

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and they stay dry!

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- **HIGH DIELECTRIC PROPERTIES**
- **LOW ASH CONTENT**
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That's why NAUGAPOLS are so definitely preferred by manufacturers of rubber-insulated wire and cable...and by the makers of specialty mechanical rubber products. If *you* require special grades or special properties in synthetic rubber, let us help you solve your particular problem.

Naugatuck Chemical

Division of United States Rubber Company
Naugatuck, Connecticut

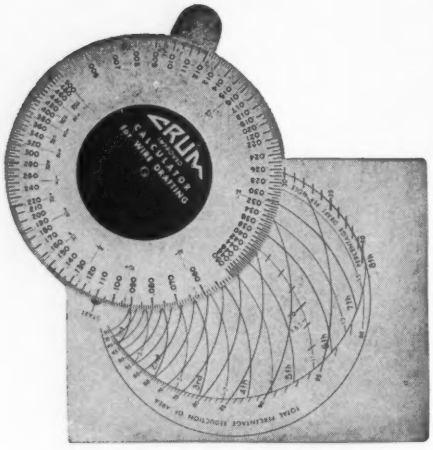
IN CANADA: NAUGATUCK CHEMICALS DIVISION • Dominion Rubber Company, Limited, Elmira, Ontario • Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • Cable Address: Rubexport, N.Y.

SAVE SET-UP TIME WITH THE . . .

CRUM CALCULATOR

FOR WIRE DRAFTING

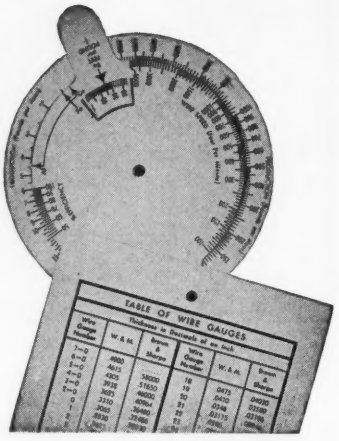
Useful and Accurate!



Front view of Crum Calculator.

THIS NEW DOUBLE-PURPOSE CALCULATOR WILL:

1. Provide quicker and more accurate information on die sizes and reduction areas;
2. Calculate wire production rates for various speeds and efficiencies.



Reverse view of Crum Calculator.

SOME OTHER FEATURES OF THE CALCULATOR

- Has new scale for more accurate determination of small percentages.
- Gives readings in B & S gauges.
- Intermediate lines provide reductions for 16 holes in one setting.
- New rectangular shaped back for better protection of calculator.
- More legible % draft-per-hole scale.
- Vinyl plastic construction, resistant to wear, warping, dirt, perspiration, wire drawing soaps—can be cleaned.
- Still fits your vest pocket.
- Handy tables of W & M and B & S gauges.
- Feet per pound calculating scale for steel, copper and aluminum wires.
- Durable, accurate, easy to use.

The improved Crum Calculator is worth its weight in gold in time saving —no laborious mathematical calculations necessary when you use it. Instruction sheet with examples accompany each Calculator. You should have one or more in your wire drawing department.

THE PRICE: $5.00 EACH

Send your orders to:

WIRE AND WIRE PRODUCTS

453 MAIN STREET **STAMFORD, CONN.**

(Exclusive distributors)

KEYSTONE XL WIRE STUDY

flowability IS THE SECRET

Cold Heading Auto Headlamp Screws
at The E. W. FERRY Screw Products, Inc.

KEYSTONE WIRE
gives better performance . . . longer life

In their modern Cleveland, Ohio, plant, The E. W. Ferry Screw Products, Inc., make a multitude of precision fasteners. One interesting example is the auto lamp screw illustrated which contains a deep Phillips recess in the head. A considerable amount of material must be made to "flow." Keystone "XL" Cold Heading Wire successfully filled this extreme forming application. The E. W. Ferry Screw Products, Inc., report that Keystone "XL" Wire gives much better performance on all difficult upsetting operations, with longer die life, minimum cracking and rejects.

The *flowability* characteristics of Keystone "XL" Wire has made it possible to successfully produce many fasteners by the modern, low-cost cold heading process. A Keystone Wire Specialist will gladly discuss your problems with you.

Keystone Steel & Wire Company, Peoria 7, Illinois

KEYSTONE STEEL & WIRE COMPANY
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Mail coupon for free booklet—
COLD HEADING FACTS! Discusses methods, technical facts, wire requirements and other data.

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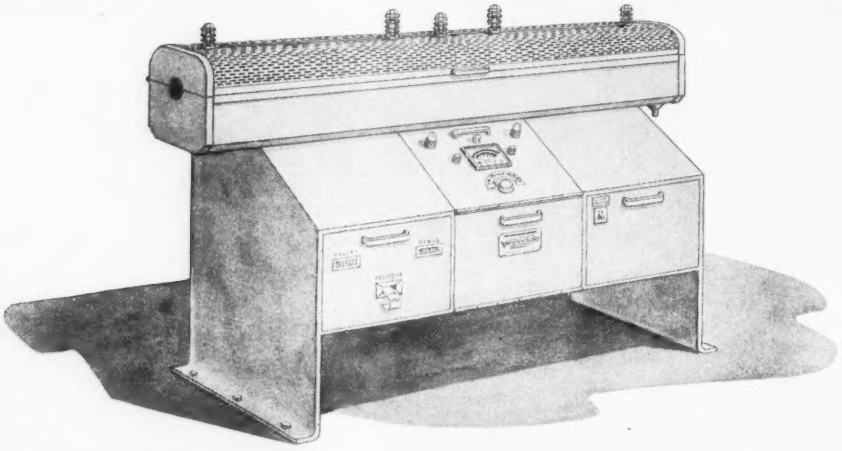
KEYSTONE
WIRE FOR INDUSTRY

James L. Entwistle PRESENTS...

The First Major Advance in SPARK TESTER Design in 20 Years!



SPARK TESTER and RECORDER, Class J

TYPE JER-15 AND TYPE JER-20

OUTSTANDING FEATURES:

- Absolute accuracy in test voltage indication under all load conditions at all wire speeds.
- All high voltage leads and energized parts totally enclosed, with de-energizing safety devices on all access doors.
- Smooth, no-step control.
- Secondary short-circuit current, held practically constant at 25 milliamperes throughout testing range of 1,500 to 15,000 volts, assures accuracy in low voltage testing while affording operator safety.
- Multiple Fault Telltale Lamps and Danger Lamps.
- Time-Delay Relays for positive fault recording.
- Accurate, permanent printed record of faults and reels.
- Stainless Steel Bead Chain in Electrode Unit for durability.
- Standard Lamps, mounted in vapor-proof condulets on Electrode Guard for visibility, are equipped with metal guards and colored globes eliminating costly colored lamps.
- Convenient, compact control panel.
- All parts are chassis or panel-mounted for easy access.

. . . developed for use on Extruder and Continuous Vulcanizing Insulating Lines can be said without qualification, to be the most sensitive, reliable, compact, safe, and advanced Sparker that has ever been built!

Guaranteed to more than meet all existing commercial and miltary specifications for Spark Testing of insulated wire and cable throughout the world, the JLE Spark Tester for the first time combines the entire assembly of Sparker, Electrode Unit, and Fault and Reel Recorder in a single, desk-type cabinet requiring only connection to the plant's power supply, and to a Measuring Machine for operation of the Fault and Reel Recorder.

The Standard Electrode Unit will handle wire speeds up to 2,000 feet per minute, and wire diameters up to ¾". Standard maximum testing voltage is 15,000. Optional 20,000-volt maximum at moderate extra cost.

Write, phone or cable for Catalog Section 2A-W956 giving full details.

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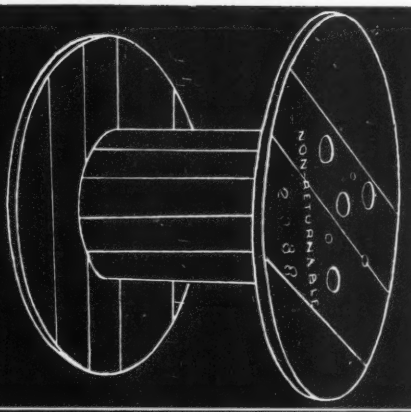
- AN EXPENDABLE PACKAGE
- LIGHT IN WEIGHT

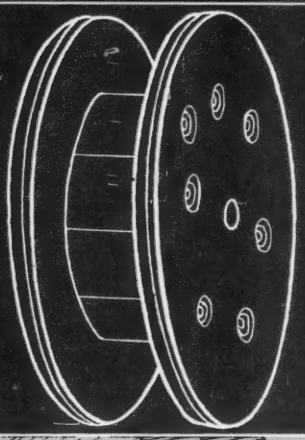
LOW IN COST
NO MAINTENANCE



the NARCO METAL BOUND

- THE QUALITY REEL THAT **LASTS** AND **LASTS** AND **LASTS**
- **FOUR** TO **SIX** TIMES THE LIFE OF ALL WOOD REELS

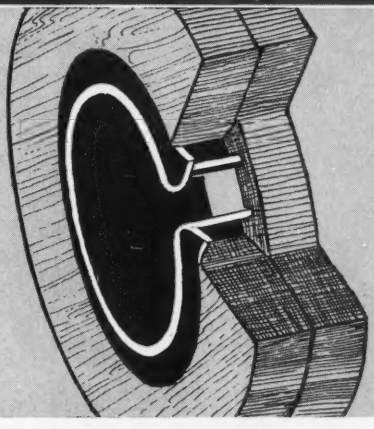
NO MAINTENANCE



the NARCO SPLIT BUSHING

- REPLACES COSTLY HUB PLATES AND CASTINGS

LOW IN COST
NO MAINTENANCE



Remember These are products of the most modern up-to-date reel plant in the world. Manufactured by a company with nearly 50 years experience and a background of exhaustive testing and research in the laboratory and the field.

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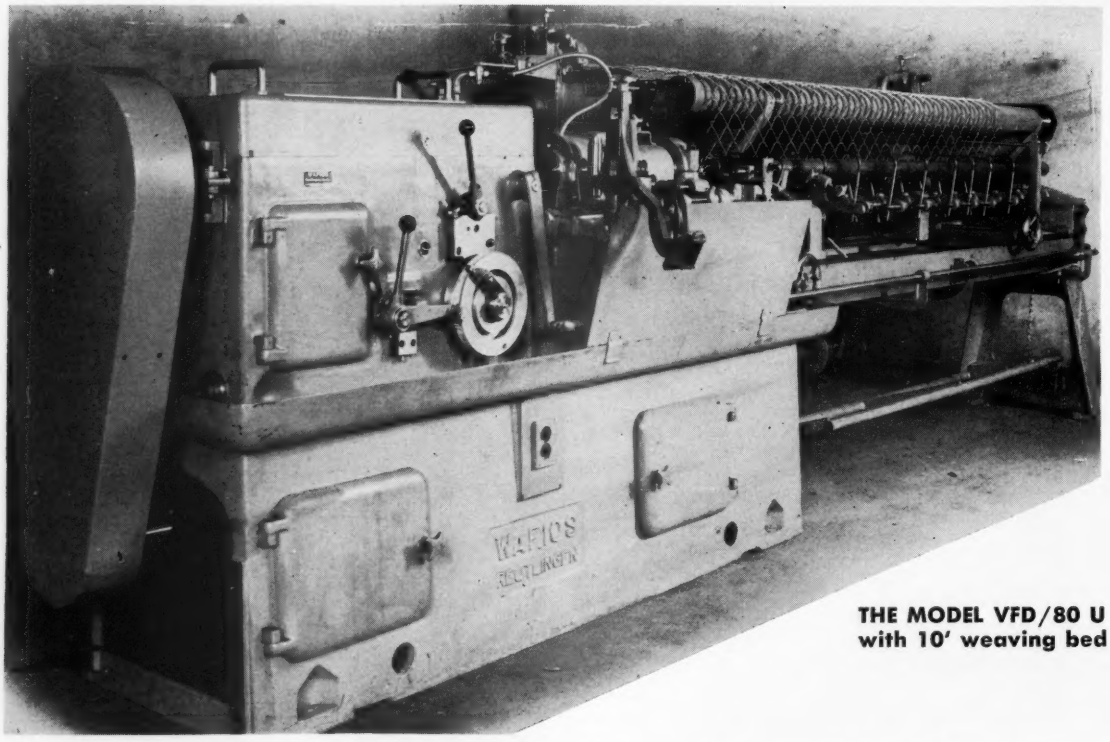
THE FIRM THAT INVENTED THE CHAIN-LINK PRINCIPLE

• • • COMES THE LATEST IN TWIN-SPIRAL MESH LOOMS



THE MODEL VFD/80 U with 10′ weaving bed

TWO COMPLETELY NEW MODELS, THE VDF/80 U AND THE VDF/100 U,
FOR THE ULTIMATE IN TRULY HIGH-SPEED PRODUCTION

The Model VDF/80 U for wires from .059" to .149".

The Model VDF/100 U for wires from .059" to .197".

Netting heights up to 12′, with all popular weaving-end finishes. Continuously operating take-up. No halting of machine to remove finished rolls. 4-Speed Gearing to achieve maximum production consistent with wire size and temper.

A model VDF/100 U is set-up for demonstration purposes here in New Jersey. Why not come and see for yourself, the latest technological advances in Chain-Link Mesh Looms. Please request appointment on your company letterhead.

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WAFIOS MACHINENFABRIK
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cold heading profits start here

The quality of the cold heading wire you use is the beginning of higher cold heading profits.

That's why so many users specify J&L Cold Heading Wire to help them get the highest quality finished parts at increased production rates, and lowest manufacturing costs.

J&L Cold Heading Wire will meet your exact requirements for:

Precise Chemical Grade and Physical Characteristics
Surface Qualities
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The result—when you specify J&L, you assure the best heading performance. Investigate the profit-making possibilities of J&L Cold Heading Wire today. It's tops in quality—competitive in price.

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STEEL CORPORATION · PITTSBURGH

J&L STEEL

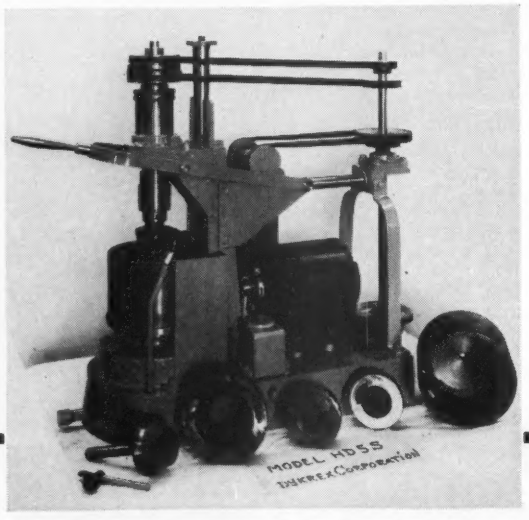
DYKREX

announces

2 New Labor-Saving Machines

for the Wire Die Industry that your Regular Die Room Help can use!

Costs less to buy! Costs less to use!

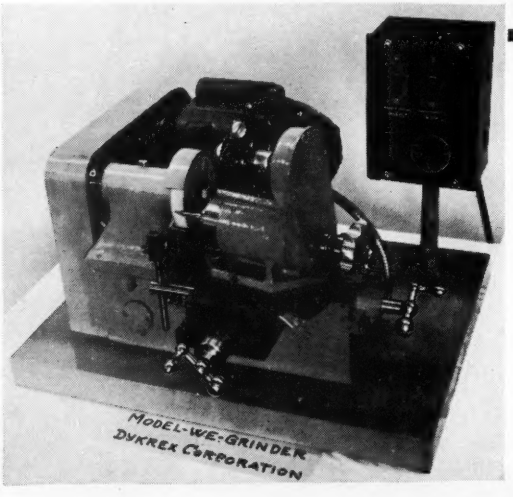


A new and larger ripping and roughing machine for large dies up to 3" diameter

Eliminates costly lathe and grinding

At last! A new *low cost* precision pin and small parts grinder up to 90 degrees included angle

Complete with motorized compound, Special Controls



These machines have been designed—engineered —and are in use in America's largest wiremills.

Dykrex-Roos Wire Die Finishing Machines —The Standard of the Wire Industry

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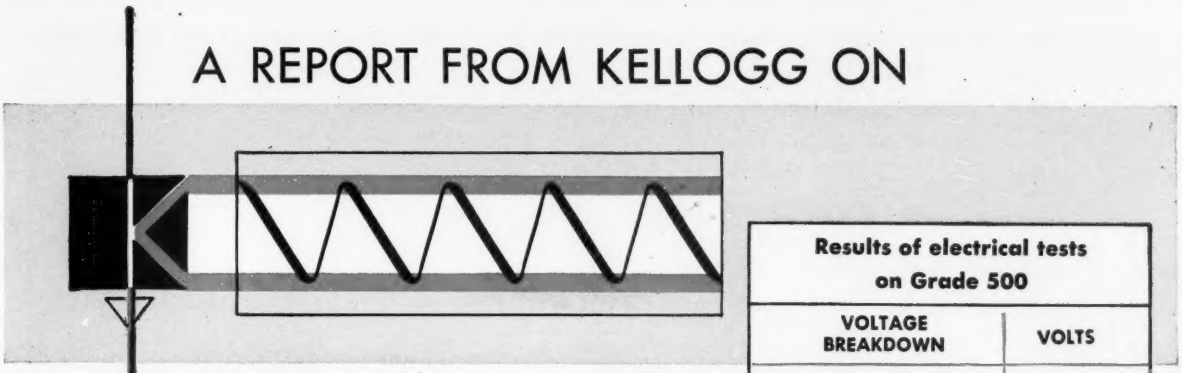
Or ask your
Tungsten Carbide Die Supplier

A REPORT FROM KELLOGG ON



KEL-F® Plastic GRADE 500

Results of electrical tests on Grade 500

VOLTAGE BREAKDOWN	VOLTS
Initial volts	13,500
at 150°C.—1 week	13,000
2 weeks	14,600
at 175°C.—1 week	13,500
2 weeks	14,500
at 190°C.—1 week	11,300
2 weeks	9,600

New Fluorocarbon Plastic Formulation Provides Wire Insulation that can withstand Continuous Operating Temperature up to 175° C.

KEL-F PLASTIC, Grade 500—like all the molding compounds in the KEL-F fluorocarbon series—is notable for its extreme resistance to high temperatures, chemical attack, humidity and abrasion.

Of special interest to the electrical field is the higher heat-aging level of wire coatings with the new Grade 500. Tests on wire insulation indicate a continuous operating range of temperatures up to 175°C. Samples of coated wire exposed to temperatures as high as 190°C. for extended periods of time (2-3 months) still maintain relatively high voltage breakdown values.

Results of these electrical performance tests are summarized in the table above. An examination of the breakdown voltages after continuous exposure to high temperatures points up the high heat-aging level reached by KEL-F PLASTIC Grade 500 coated wire.

TWO TYPES AVAILABLE

KEL-F PLASTIC GRADE 500 is produced in two distinct types:

GRADE 500-F, a less crystalline type that resists embrittlement by high temperatures. Recommended for general wire and cable insulation, hook-up wire, thin wall tubing, and spaghetti.

GRADE 500-R, possesses same general properties as F type, only a slightly more rigid formulation. Recommended for use in connector insulation and for coil forms.

MOLDABILITY

The new Grade 500 permits extrusion of high molecular weight coatings and thin wall tubing that resist embrittlement when exposed to higher temperatures. Less crystalline in structure, Grade 500 can be fabricated without danger of splitting or crazing when heated. The flexibility of Grade 500 coated wire is also slightly improved.

TECHNICAL SERVICE

KEL-F PLASTIC Grade 500 is a result of Kellogg's comprehensive research in the field of fluorocarbon chemistry. Our technical staff will be happy to work with you in developing specific applications for the new Grade 500.

REPORT ON KEL-F PLASTIC, GRADE 500

Kellogg's TECHNICAL CUSTOMER Service Staff has prepared a technical report on KEL-F PLASTIC, Grade 500. It contains information on properties, extrusion techniques and operating conditions, electrical tests, and field evaluation of the new 500 Grade. To get your copy, just clip and mail coupon below.

® KEL-F is a registered trademark of The M. W. Kellogg Co. for its fluorocarbon products.

THE M. W. KELLOGG COMPANY
Subsidiary of Pullman Incorporated
Chemical Manufacturing Division
P. O. Box 469, Jersey City, N. J.

Please send me a copy of your First Report on KEL-F PLASTIC—Grade 500.

Name_____

Firm_____ Position_____

Address_____

City_____ Zone____ State_____

PROPERTIES OF KENNAMETAL DIE GRADES

Grade	Hardness (Rockwell A)	Transverse Rupture psi	Young's Modulus of Elasticity psi	Compressive Strength psi	Suggested Applications
K82 K84 K86	90.0 91.0 91.5	275,000 300,000 250,000	65,500,000 74,000,000 72,000,000	663,000 600,000 590,000	Draw dies (all sizes) for drawing tubes, bars and wire; for cupping and deep drawing.
K90	85.0	360,000	61,600,000	518,000	Heavy blanking dies up to 3/16" steel. Dies for: cold-heading, nail gripping, nibbling, swaging steel rods, heavy curling, coining.
K91	86.5	380,000	64,400,000	540,000	Light-heavy blanking up to 1/16" steel; rivet sets, crushing hammers, washers, dies.
K92	87.5	385,000	71,900,000	572,000	Lamination dies on .004" to .035" silicon steel; medium blanking dies softer metals up to .040"; heavy forming dies; heavy heading machine hammers; hardware curling dies.
K94	90.0	325,000	77,900,000	600,000	Tube swaging dies; light blanking up to .020" silicon steel; medium blanking, softer metals up to .040"; heavy forging dies; heavy heading machine hammers; curling dies for hardware.
K95	90.5	300,000	82,000,000	644,000	Light blanking up to .015" silicon steel; light heading hammers; wear-resistant parts.
K96	92.0	250,000	94,300,000	800,000	Dies for asphalt floor tile; slate-covered asbestos shingles; abrasive-covered roofing papers; and in the paper industry for slitter knives and plates; blanking and pressing dies; compacting dies for powder metallurgy, wear-resistant parts.

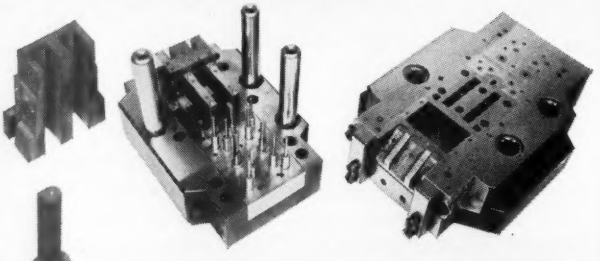
You can select the right grade of Kennametal* for each specific die requirement

With six grades in the "90 series" and three grades in the "80 series," Kennametal offers the right grade for any die application. The 90 series covers the full range of tungsten carbide grade requirements—from K90 with exceptional strength for heavy operations to K96 with maximum resistance to wear for such jobs as compacting and cutting highly abrasive materials.

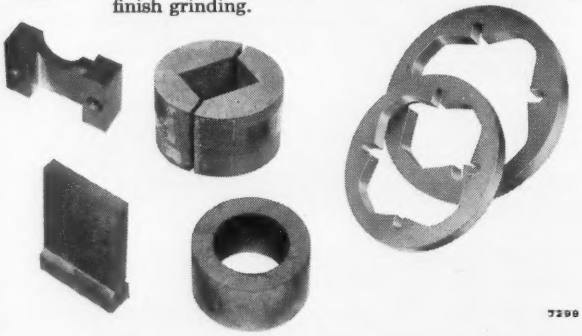
In the 80 series, Kennametal offers three exclusive grades with unique properties not found in any other carbide. These three $WTiC_2$ grades, with a special slippery quality, have been created especially for drawing, forming and sizing operations where the slightest amount of galling or pickup cannot be tolerated.

From these two groups you can select the right grade for each specific job to assure highest production rates, to reduce die cost and maintenance, and provide products of uniformly accurate dimension and finish. Kennametal die engineers will gladly work with you in analyzing your die operations. They can show you performance reports on Kennametal over a wide range of applications—many of which may be similar to your operations. Call your nearest Kennametal office or write us direct. If you wish more information, send for Booklet B-100 and a copy of our new die grade selection chart. Kennametal Inc., Latrobe, Pa.

*Registered Trademark



Use Kennametal Die Grades for blanking, stamping, compacting, perforating, cold heading, swaging, forming, cupping, drawing. Illustrations show a few of the many types of die parts made of Kennametal for producing a diversification of shapes to exact tolerances with a minimum of finish grinding.



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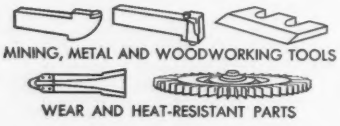
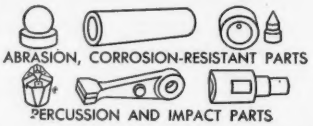
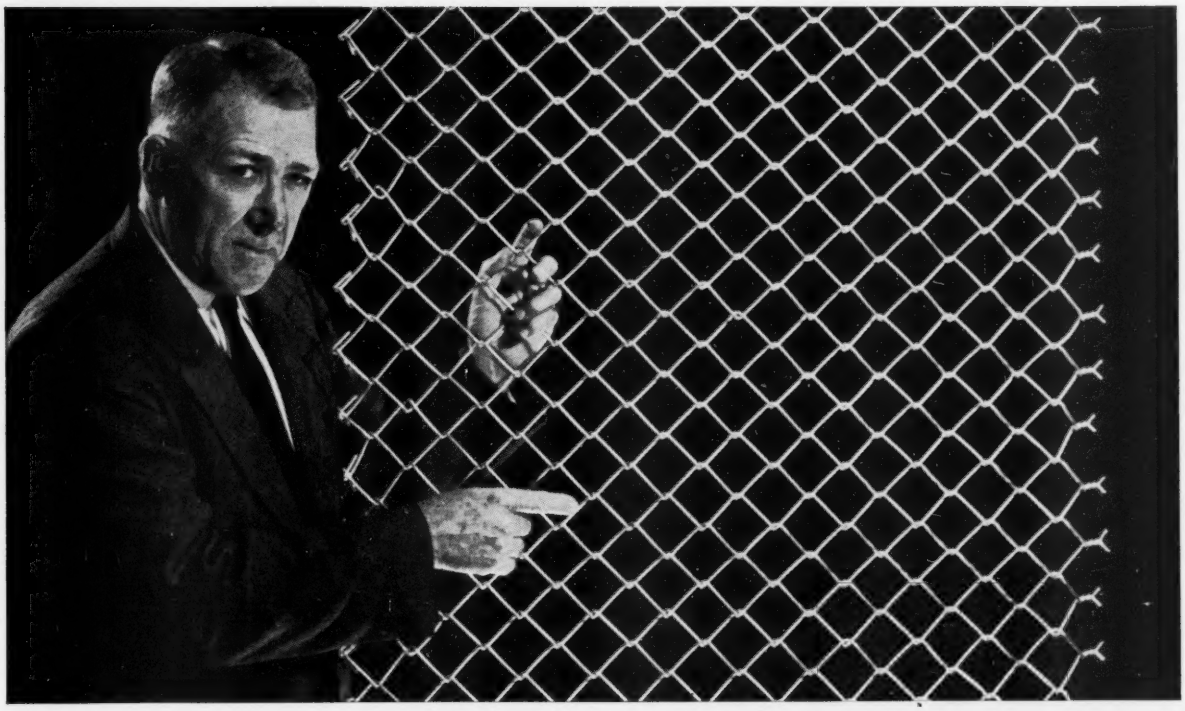


INDUSTRY AND
KENNAMETAL
...Partners in Progress





Fence made from bethanized wire stays strong and bright

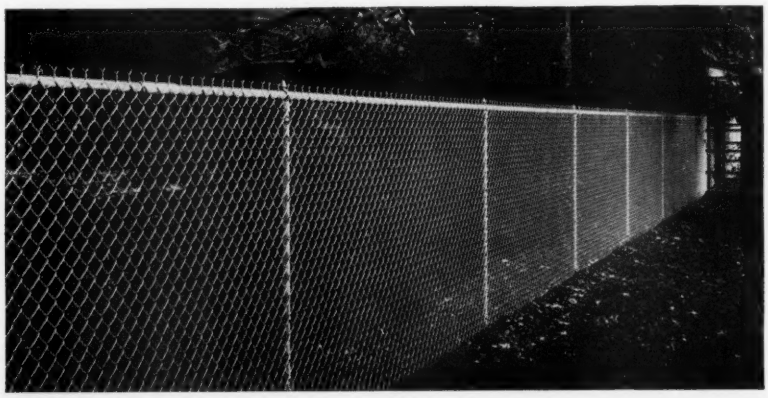
Much of the chain-link fencing is made today from bethanized wire — and for good reasons. The uniform coating of 99-pct-pure zinc protects the wire against corrosion long after other types of fence have become unsightly or rusted away. Bethanized fence keeps its sparkle through years of service because of the tight bond of pure zinc on steel. Fence erectors like bethanized fence because the wires are not rough and won't slash fingers.

Pure zinc, tightly bonded to steel . . . that's bethanized wire

There are no thin spots in the bethanized zinc armor to give rust a foothold. The electrolytic process deposits a coating that is uniform over every inch of the wire.

Bethanized wire is ideal for twisted wire brushes, chain, conveyor belts and other products which require severe forming, swaging, cold-heading, and thread-rolling. You can bend it, twist it around its own diameter — even draw it through dies to fine gage. The pure zinc stays on.

Whether you need hard or soft-temper wire, light or heavy zinc coatings, we will be glad to ship you a trial order of bethanized. Just phone or write our nearest sales office for full details.



The bethanized coating of pure zinc adds extra years of service to chain-link fence. Photo courtesy: Atlas Fence Co., Philadelphia, Pa.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Unretouched photograph of *Carboloy R-8 Wire Die*, used for drawing low-carbon steel at the Wyckoff Steel Company, New England Works. After producing 5,014,000 lbs. of wire in 14 years, the inside diameter has increased only .0037". (R-8 die shown 1⅓ times actual size.)

MORE THAN 5,000,000 LBS.
OF WIRE DRAWN DURING . . .

14 YEARS ON THE JOB . . . AND THIS CARBOLOY DIE HAS CHANGED ONLY .0037"

This Carboloy* R-8 die has drawn more than 2000 miles of wire since put in operation in 1942. Yet its inside diameter has changed only .0037" since it was purchased. What's more, the approach has never needed polishing; the wear ring has never needed removing.

This case history is one of the most spectacular in the history of carbide wire dies. But it is a typical example of the extra-long service life you can expect from every Carboloy die.

Equally important, you can depend on savings in grinding and downtime costs . . . longer production runs; smoother, more accurate wire.

Add in the other Carboloy "bonuses" for wire die users: immediate local delivery, on-the-job engineering service, wire-die training school for your personnel, and die servicing and finishing facilities. You'll see why more and more mills specify Carboloy carbide dies.

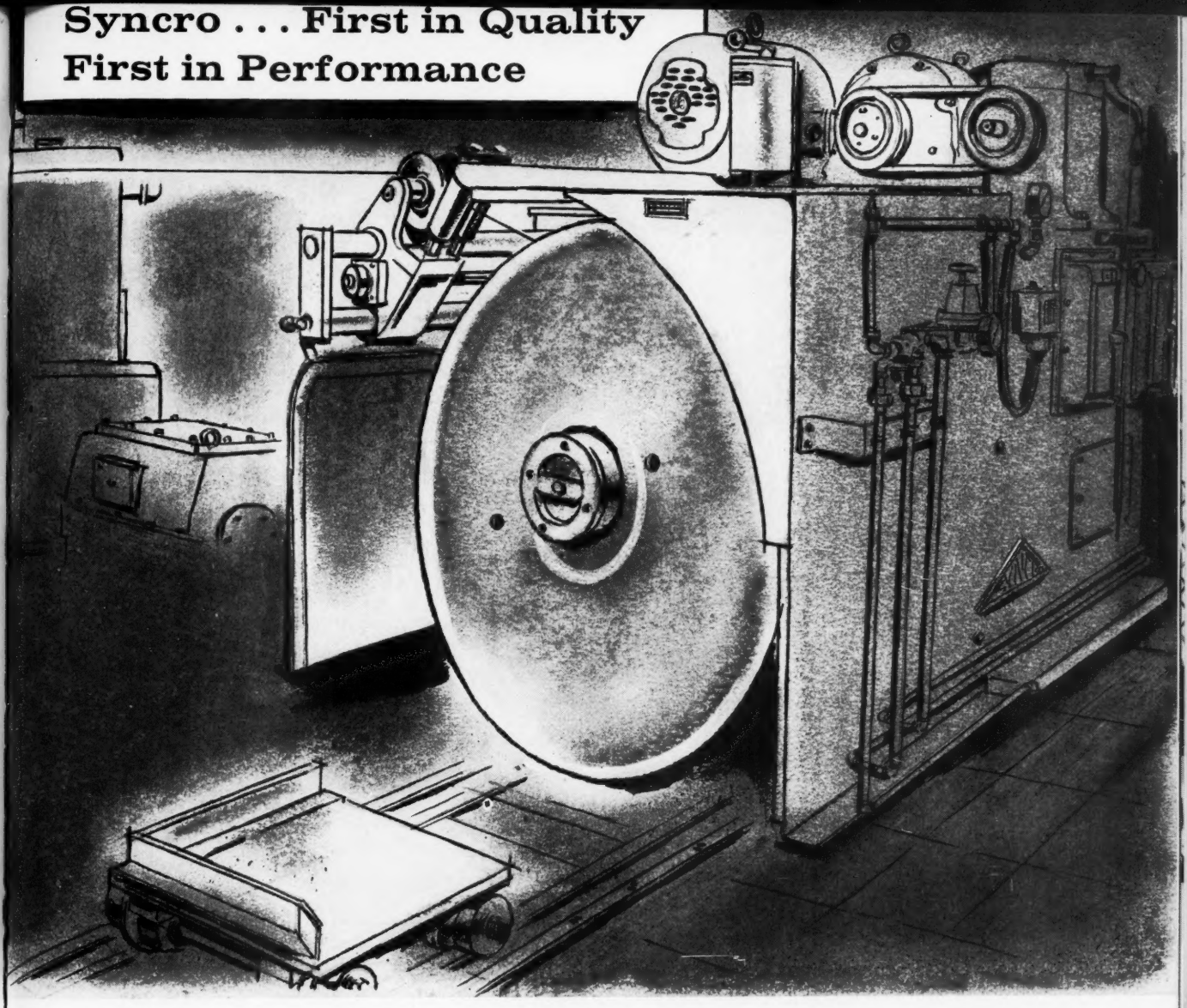
For engineering service, or your copy of the Carboloy Die Catalog and Service Manual, write: *Metallurgical Products Department of General Electric Company, 11171 E. 8 Mile Blvd., Detroit 32, Michigan.*

CARBOLOY

CEMENTED CARBIDES

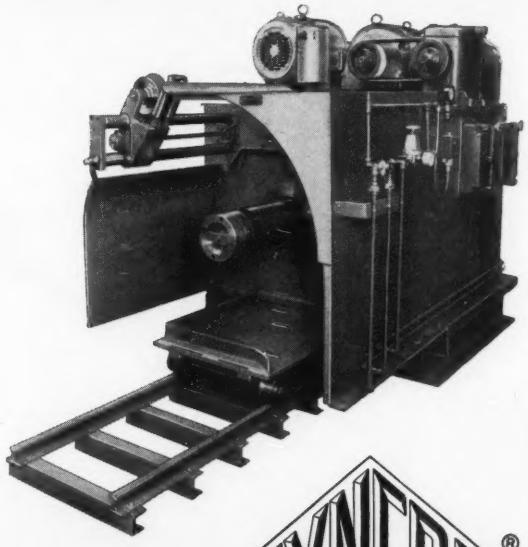
*Carboloy is a trademark of General Electric Company

Syncro . . . First in Quality
First in Performance



The Syncro series "H" spoolers have been engineered to meet the ever increasing production demand for extra high speed spooling in wire drawing operations. They are the result of research and manufacturing skill that has made the name of Syncro a seal of superiority the world over.

Models are available for making 300 to 4000 lb. packages of wire. All spoolers included in this series are independently driven and incorporate means for adjusting and also maintaining tension uniformity during the winding of a spool. Syncro series "H" spoolers feature fully adjustable hydraulically actuated traverses, air operated expanding arbors and associated spool ejectors as well as highly efficient electric brakes. Consult Syncro for complete details.



Syncro Machine Company

SYNCRO®

Better Machinery for the Wire Industry

PERTH AMBOY, NEW JERSEY, U.S.A. AFFILIATED COMPANY: WINGET SYNCRO LTD. ROCHESTER KENT, ENGLAND

WIRE DRAWING MACHINES • DIE STRINGERS • CONTINUOUS ELECTRIC ANNEALERS • PAYOFFS • CAPSTANS • WIRE INSULATORS • HEAVY DUTY TAKEUPS • TAPERS • SPECIAL MACHINERY

the modern bee uses

CF&I-WICKWIRE WIRE!

Modern bees have stopped storing honey in handy hollow trees. Instead, they choose man-made hives—hives which are neatly divided by wood and special round, tinned, hard drawn, low carbon CF&I-Wickwire Bee Wire.

Chances are you don't need wire to make bee hives. But *you may need one or more of the nearly 100 different categories of specialty wire for which CF&I-Wickwire is famous.* Let us show you how we can meet your most rigid chemical and physical specifications on high and low carbon wire in all sizes, shapes, tempers, finishes and grades.

Check This List!

FOR THE WIRE YOU REQUIRE, SEE CF&I-WICKWIRE.

FLAT AND SHAPED WIRES
Armor Wire
Bobby Pin Wire
Bookbinder Wire
Brush Wire
Casing Wire
Cotter Pin Wire
Curtain Spring Wire
Die Spring Wire
Gutter Broom Wire
Lock Spring Steel
Rake Tine Steel
Regulator Spring Wire
Snake Fishing Steel
Stapling Wire for Preformed Staples (Flat)

LOW CARBON FINE AND SPECIALTY WIRE
Bee Wire
Bonnet Wire
Bookbinder Wire
Broom Wire
Clip Wire
Dent Spacer Wire
Drapery Pin Wire
Florist Wire
Fuse Wire
Glass Netting Wire
Hairpin Wire
Hook and Eye Wire
Mattress Wire
Picture Cord Wire
Picker Tooth Wire
Pin Ticket Wire
Pin Wire
Ring Traveller Wire
Spiral Binding Wire
Stapling Wire
Stapling Wire for Preformed Staples
Stone Wire
Weaving Wire
Weaving Wire for Fly Screen Cloth
Wissco Iron Wire

HIGH CARBON FINE AND SPECIALTY WIRE
Aircraft Cord Wire
Armor Wire
Belt Hook Wire
Bobbin Ring Wire
Brush Wire (Tempered and Untempered)
Brush Wire (High Strain)
Chrome Vanadium Spring Wire
Core Wire (Aluminum Cable Steel Reinforced)
Curtain Spring Wire
Flexible Shaft Wire
"Gamma" Spring Wire (Upholstery Spring Wire)
Zig Zag Wire
No-Sag Wire
Hat Wire
Heddle Wire
Hose Reinforcement Wire
Hose Wire, Mechanical
Hose Wire, Vacuum and Defroster
Rope Wire
Signal Corps Wire
Spoke Wire
Hard Drawn Spring Wire
Oil Tempered Wire
Spheroidized or Annealed Spring Wire
Tire Bead Wire
Valve Spring Wire

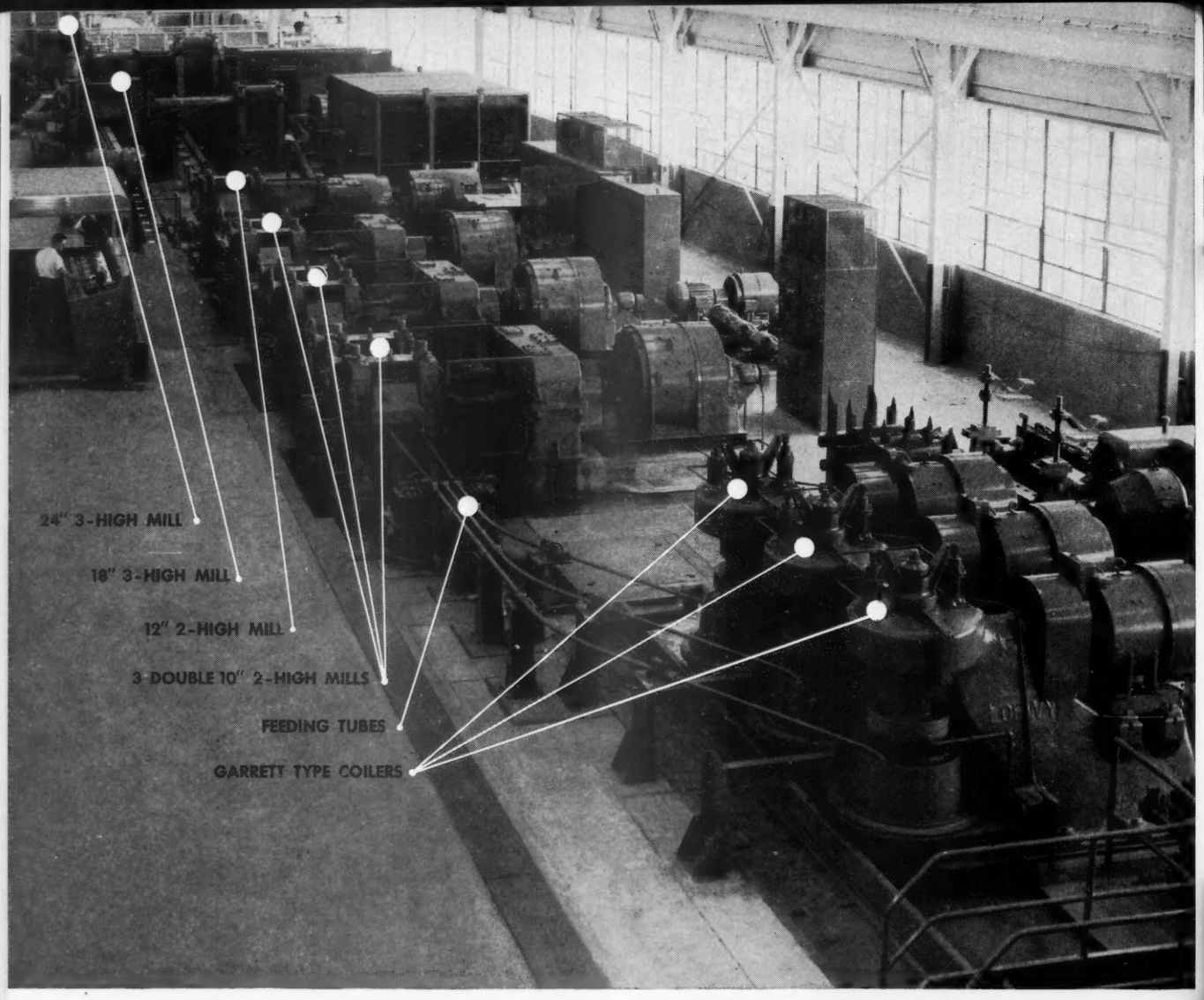
MANUFACTURERS LOW CARBON COARSE WIRE
Bag Tie Wire
Basket Handle Wire
Box Binding Wire
Brush Handle Wire
"Cal-Tie" Wire
Can Key Wire
Case Hardened Ball Wire
Chain Wire
Clamp Wire
Clothes Pin Wire
Concrete Wall Reinforcement Wire
Garment Hanger Wire
Hay Baling Wire (Coiled)
Lingo Wire
Lintel Wire
Loop Wire
Merchant Quality Wire
Pail Bail Wire
Rivet Wire
Stapling Wire
Strand Wire
Tying Wire
Welding Wire
Wissco Iron Wire
Industrial Quality Wire
Cold Rolling Quality Wire
Heading, Forging or Roll Threading Quality Wire
Medium High Carbon Wire

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Casper Denver • El Paso • Ft. Worth • Houston • Kansas City • Lincoln (Neb.) • Oklahoma City • Phoenix Pueblo • Wichita • PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • Salt Lake City San Francisco • Seattle • Spokane • WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo Chicago • Detroit • New Orleans • New York • Philadelphia • CF&I OFFICE IN CANADA: Toronto
CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

4238



This installation has a capacity of 40,000 lbs per hour for 2-strand rolling with finished coil delivery every 19 seconds.

new Loewy copper wire rod mill reduces wire bars to 5/16" wire rod, automatically

At the plant of a leading manufacturer of electric cable, this new Loewy mill is rolling 5/16" and 7/16" copper wire rod from standard wire bars in a continuous, fully automatic operation.

The mill consists of two 3-high roughing mill stands, seven continuous finishing stands and three Garrett coilers. Copper wire bars are conveyor-fed into the furnace. After leaving the furnace the ingots are rolled down in 14 passes to finished size. Leaving the last stand at a speed of 2400 FPM the wire is coiled. The coils are tied and conveyed into a pickling line. The entire procedure is automatic and all operations are controlled from one operator pulpit.

Like this high-speed wire rod mill, all Loewy equipment is designed to produce more, in less time, at lowest cost. We design, build and install blooming and slabbing mills, plate mills, structural and rail mills, bar and skelp mills, continuous billet and strip mills for ferrous and non-ferrous metals as well as high-speed foil mills. For illustrated bulletin 14002, write Dept. 170, Loewy-Hydropress Division, BLH Corporation, 111 Fifth Avenue, New York 3, N.Y.

BALDWIN BLH LIMA-HAMILTON

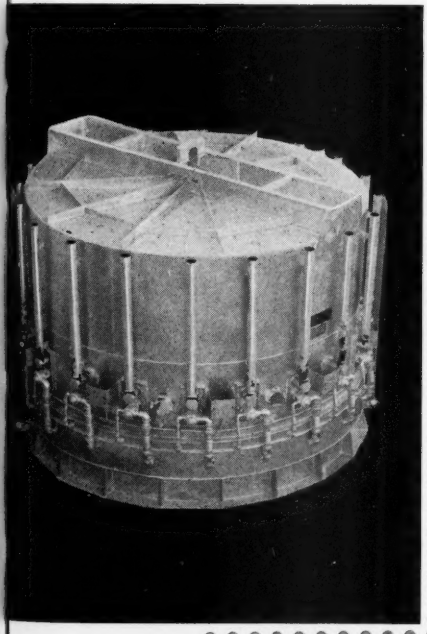
LOEWY-HYDROPRESS
BALDWIN-LIMA-HAMILTON

DIVISIONS: Austin-Western • Eddystone • Hamilton • Electronics & Instrumentation • Lima • Madsen • Loewy-Hydropress • Pelton • Standard Steel Works

There's only one way

to improve quality... increase yield... lower costs...

that's wire annealing with Lee Wilson HIGH Convection Furnaces



Fuel inputs are approximately doubled! Fan drives now are powered from 7½ h.p. to 25 h.p.! O-tubes have decreased fuel consumption!

These features can be applied to existing equipment as well as new projects. Ask for an engineering analysis of your wire annealing problems!

Lee Wilson* ENGINEERING COMPANY, INC.
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HIGH CONVECTION ANNEALING FURNACES
MAKE THE BEST METALS BETTER

*ORIGINATORS AND LEADING PRODUCERS OF HIGH CONVECTION ANNEALING FURNACES

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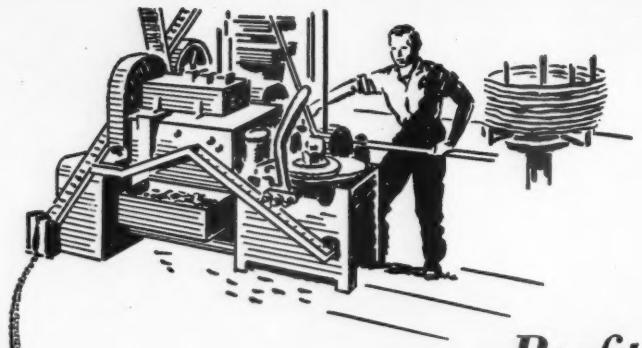
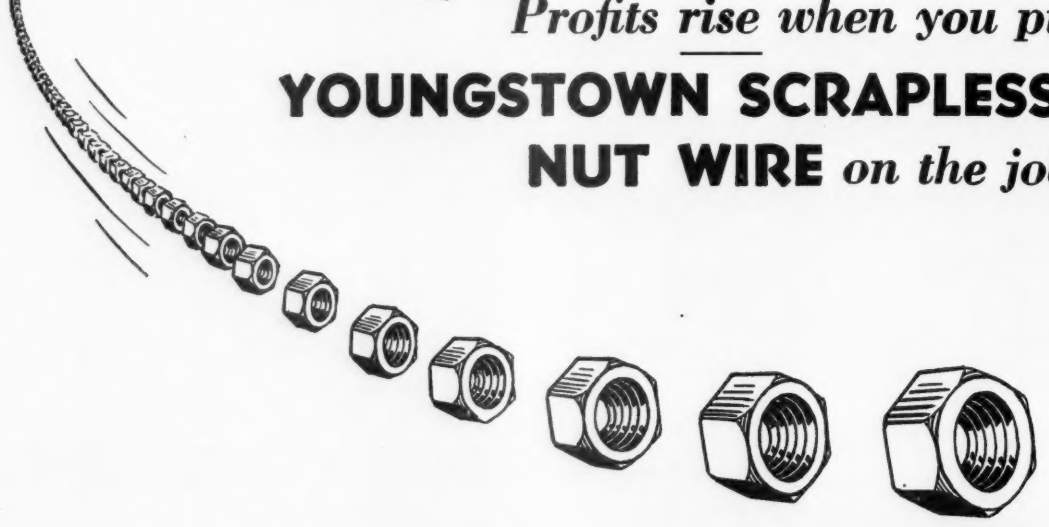


Profits rise when you put

YOUNGSTOWN SCRAPLESS NUT WIRE *on the job!*



"Production up — rejects down which increased our over-all profit." We hear this story over and over from leading cold heading operators who specify and rely on Youngstown Scrapless Nut Quality Wire. It comes to your shop free from all piping, injurious seams, laps, die marks, internal tearing and cupping, and non-metallic inclusions —all of which defects skyrocket your reject rate.

Remember, because Youngstown controls all its processes, from ore mining to bundling of the finished wire, it's your guarantee for a continuous production of high quality, brightly polished nuts. Its smooth, strong coating prolongs die life thus minimizing costly die replacements.

Youngstown Scrapless Nut Quality Wire is immediately available in standard AISI as well as special resulphurized steels. Also, Cold Heading Bolt Wire, of the same high Youngstown quality, is supplied in all standard carbon analyses. Phone or write today to our nearest District Sales Office for any additional help or information.

Youngstown

QUALITY YOUNGSTOWN SERVICE

SCRAPLESS NUT QUALITY WIRE

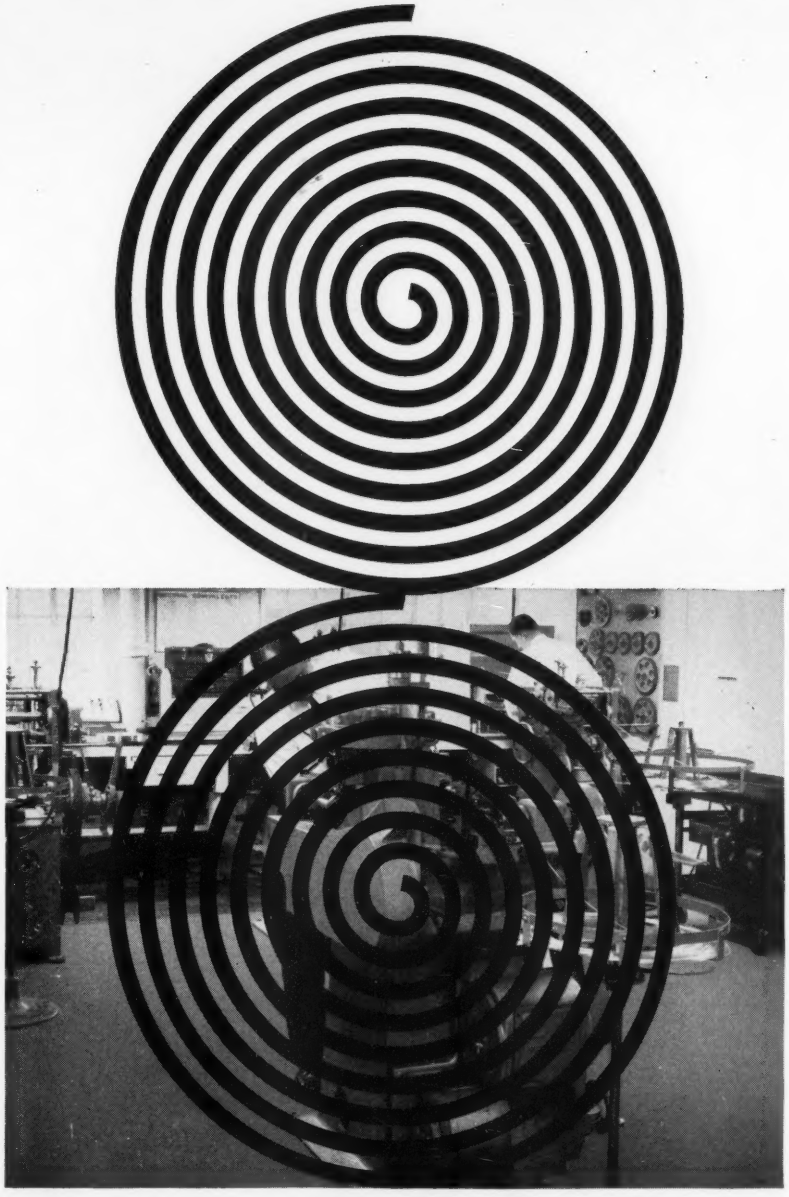
THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices Youngstown, Ohio District Sales Offices in Principal Cities.

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - BLACK PLATE - RAILROAD TRACK SPIKES - MINE ROOF BOLTS

SPRING CLINIC

Torrington leads the field in the development of the most advanced wire forming equipment available today. One of the reasons is Torrington's Wire Forming Laboratory, devoted exclusively to the professional springmaker's problems. This kind of close and constant study of our customers' needs has resulted in wire forming machinery tailored to meet the toughest requirements for versatile and economic production. If *you* have problems in coiling or costing, your inquiries will be classified CONFIDENTIAL!



THE
TORRINGTON
MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT
VAN NUYS, CALIFORNIA · OAKVILLE, ONTARIO

Are You Drawing
Copper Wire Directly
from .250" down to .0315"?

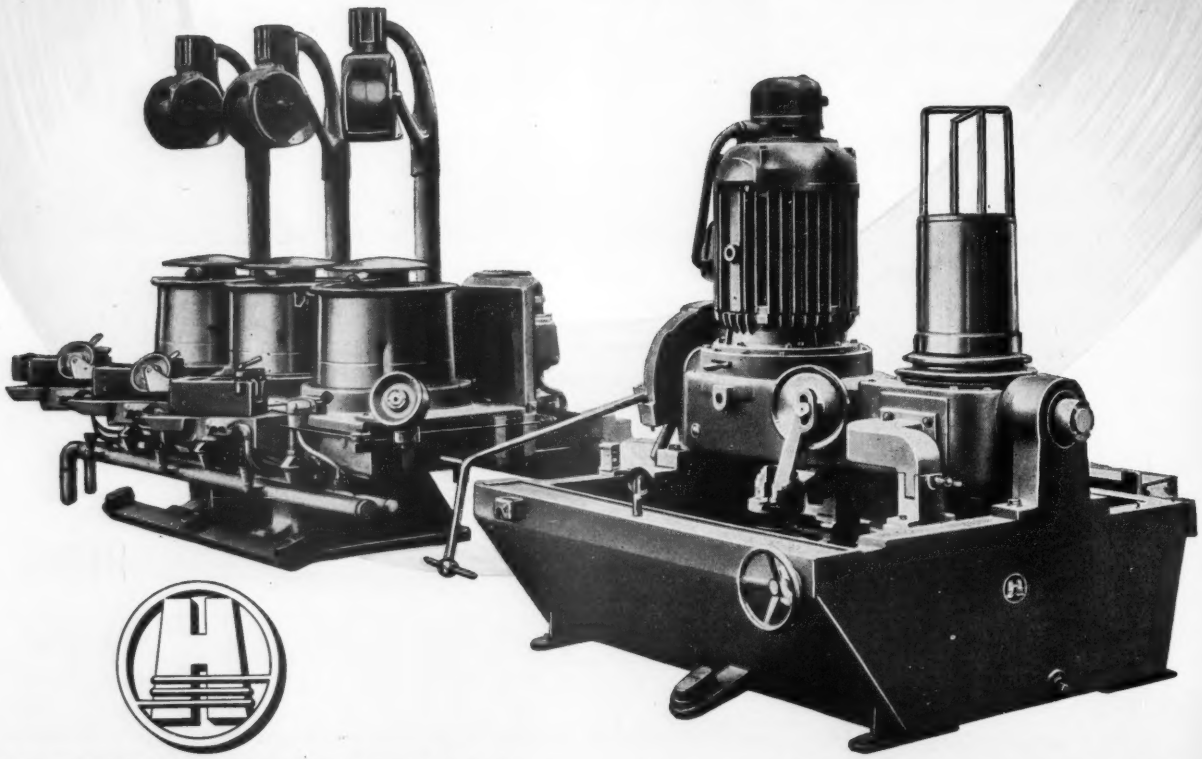
For this range, we recommend our

NON-SLIP/SLIP WIRE DRAWING MACHINE
MODEL G II/TF II D

The advantages of this combination of machines are as follows:

1) Drawing proceeds without interruption in one operation
2) Lower costs through combination of two operations
3) Finished wire with bright, flawless surface

Please submit your inquiries, we shall be glad to quote on your particular wire drawing problems.



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Sole Representative in the U. S. A.:

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Nothing finer!

A statement from
a conservative organization:

"Our records show that when a manufacturer once discovers the uniform quality of Roebling flat spring steel, he becomes a steady Roebling customer."

You, too, *pay* for the best spring steel... make sure you *get* it. Specify Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J.

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Subsidiary of The Colorado Fuel and Iron Corporation

S.S. United States . . . most modern, fastest liner afloat.

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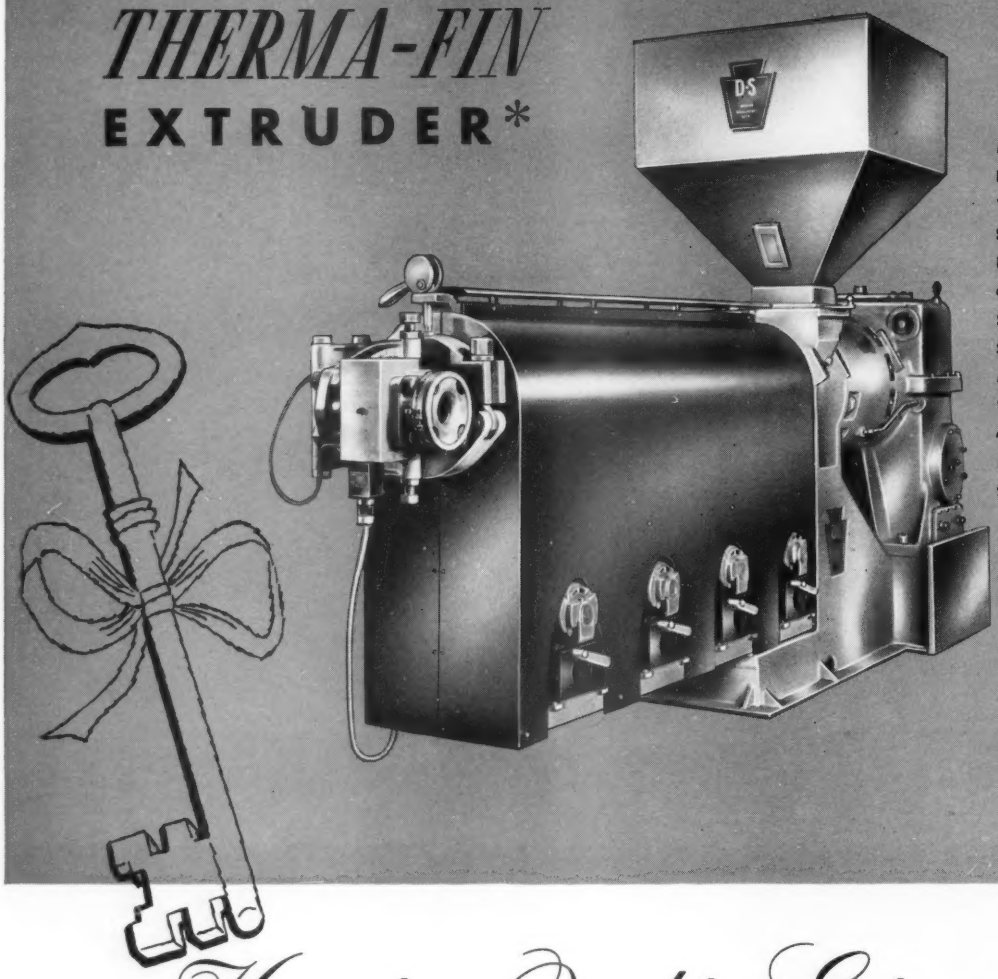
DAVIS-STANDARD®

THERMA-FIN EXTRUDER*



Model 600T Davis-Standard THERMA-FIN Super Extruder Having 6" Bore. Standard and Super Models Available in 1½", 2", 2½", 3¼", 4½" and 6" Bore Sizes.

Key to Quality Extrusion

There are several important features an extruder must have in order to produce the high quality extrusion needed for many applications. People who are familiar with the operation of thermoplastic extruders know that one of the most important features to look for in an extruder is accurate temperature control.

Davis-Standard's *THERMA-FIN* temperature control system is unique in the field. Its design represents the results of many years of studying extruder requirements, and the capabilities of *THERMA-FIN* Extruders have even exceeded all expectations.

Catalog sheets and other literature are available for all sizes of *THERMA-FIN* Extruders.

For copies of this literature, write to:

*U. S. Patents Pending.

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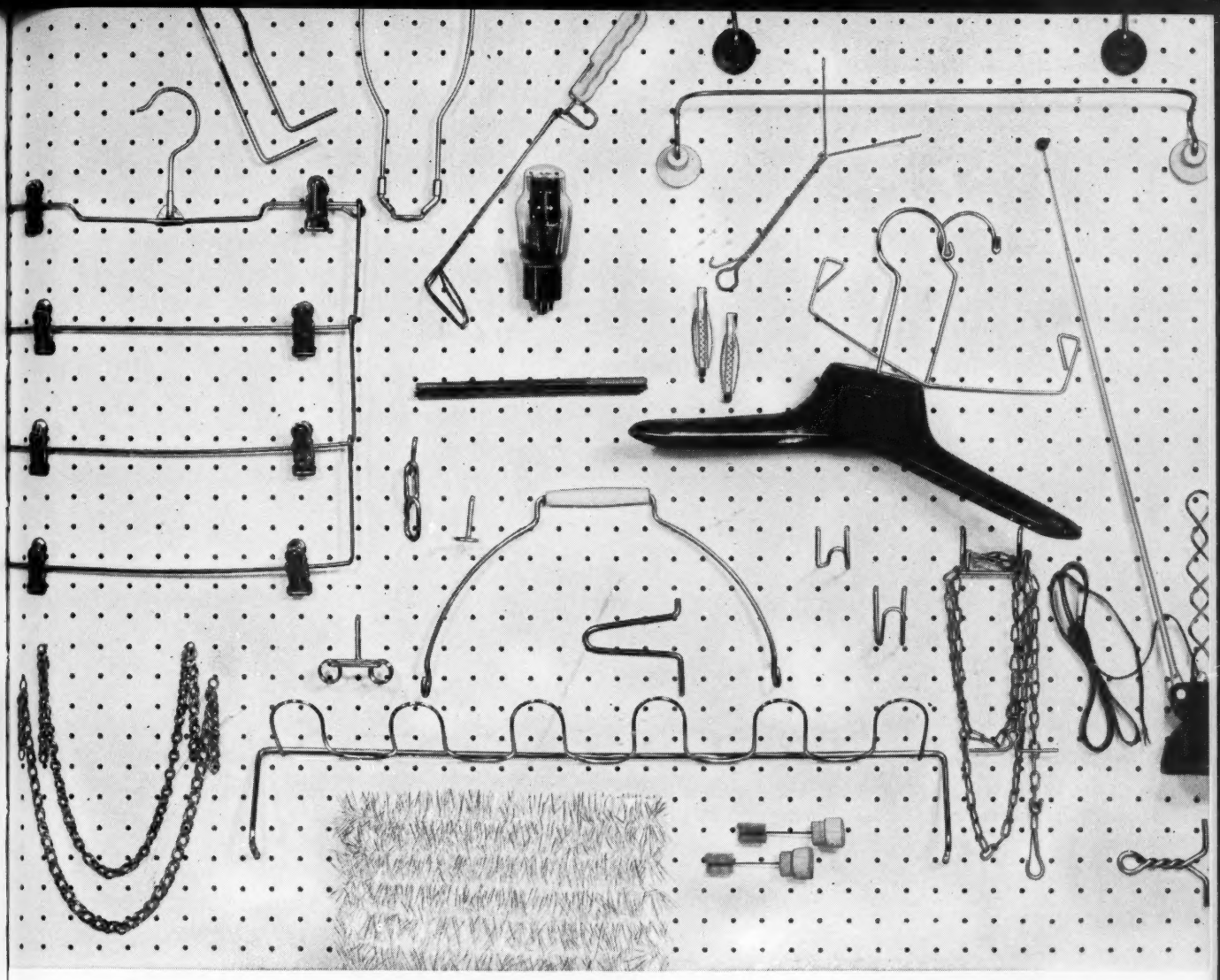
SOLE SELLING AGENTS FOR ... **THE STANDARD MACHINERY COMPANY**

World's Largest Manufacturers of Custom-Built Extruding Machines

IN EUROPE AND THE STERLING AREA, CONTACT FINNEY PRESSES LTD., BIRMINGHAM, ENGLAND



How these products were improved and costs lowered . . . with **NICKELPLY*, BRASSPLY*** and **COPPERPLY*** wire!

● National-Standard Nickelply, Brassply and Copperply is electro-jacketed steel wire—a new development offering important advantages to manufacturers and users of wire forms and components. Specifically . . . . .

The jacket metal, precisely concentric and to the required thickness, *is inseparably bonded to the steel wire.* The materials can be severely formed, twisted, swaged, welded, roll threaded or redrawn without fracturing the jacket metal or otherwise exposing the base metal. Thus these new materials can often replace solid nickel, brass or copper wire, or can eliminate the costly post-plating of steel wire forms . . . and with unmatched assurance of coating coverage! Advantages in strength, durability and economy are obvious.

Nickelply, Brassply and Copperply are now available commercially in diameters up to .340". Pertinent data on coating weights, strengths, finishes, base materials, corrosion resistance, etc., are given in Bulletin K-10. Why not send for it now and explore these new possibilities?

*Trade Mark National-Standard Company

NATIONAL-STANDARD COMPANY • NILES, MICHIGAN
Tire Wire, Stainless, Fabricated Braids and Tape

ATHENIA STEEL DIVISION • CLIFTON, N. J.
Flat, High Carbon, Cold Rolled Spring Steel

REYNOLDS WIRE DIVISION • DIXON, ILLINOIS
Industrial Wire Cloth

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NATIONAL-STANDARD Company
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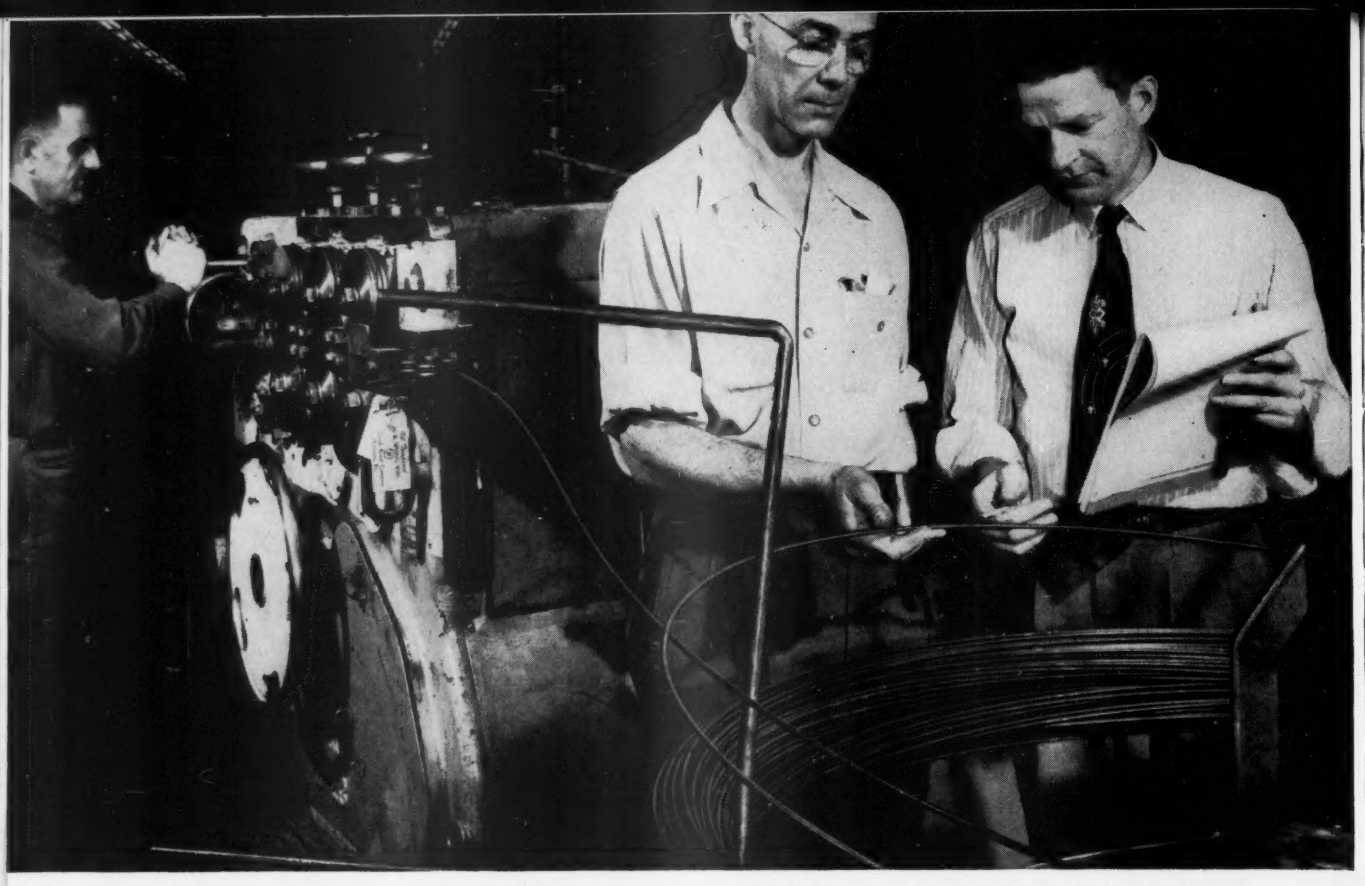
WAGNER LITHO MACHINERY DIVISION • JERSEY CITY, N. J.
Special Machinery for Metal Decorating

WORCESTER WIRE WORKS DIVISION • WORCESTER, MASS.
Round and Shaped Steel Wire, Small Sizes



Walter Casler, left foreground, foreman of automatic production, and Les Danner, assistant purchasing agent, inspect Pittsburgh Steel Company high-carbon, oil-tempered MB wire at Raymond Manufacturing Company plant at Corry, Pa.

Peter Dubrosky, assistant to chief inspector at Raymond Manufacturing Co., Corry, Pa., plant, measures extension of a Westinghouse Laundromat tub spring during a quality control inspection.

You Own 1,000 Springs

Pittsburgh steel wire used by Raymond Manufacturing Co. in long-lasting Westinghouse Laundromat® Springs

One thousand springs of all sizes, shapes and functions are the property of the average home owner. And if the family car is included, the figure would be over 1,600.

Count the many springs in one popular model refrigerator. Add the tiny springs that control thermostats in electric or gas ranges. Throw in the three rugged springs that suspend the automatic washer's tub (if it's a Westinghouse Laundromat®).

Springs serve every day in dozens of ways—silently, surely and safely. Making them is a job requiring top-flight design, best quality materials, the latest coiling machines, plenty of experience and know-how.

A case in point—take one of the nation's oldest and largest spring makers, Raymond Manufacturing Company, a division of Associated Spring Corporation.

• **Three Vital Springs**—Raymond helped develop and now makes three vital springs which support the tub unit in Westinghouse Electric Corporation's Laundromat. A major supplier of the .207 oil-tempered MB wire from which the springs are coiled are Pittsburgh Steel's wire mills in Monessen, Pa.

Raymond meets Westinghouse's rigid specifications precisely. And Raymond officials give Pittsburgh wire credit for a strong assist.

Les Danner, Raymond's assistant purchasing agent who buys 2,200

sizes and types of materials at Corry, Pa. says:

"I'm fully sold on the quality of Pittsburgh Steel's wire. Pittsburgh Steel has become a major supplier for us because its quality is tops."

Walter Casler, foreman in the automatic production department, has 26 years of experience behind him when he says:

• **"Best I've Ever Seen"**—"I don't ever recall a rejection of Pittsburgh Steel's wire for quality. Pittsburgh's oil-tempered, especially, is some of the best wire I've ever seen."

Raymond must depend on the quality of the wire when making the Laundromat springs. These springs are coiled extension springs, tapered at one end to a bell shape. Two of the three springs on each tub are 6⅜ inches long, 2½ inches O.D., and weigh one pound, seven ounces each. The third spring is smaller.

The two larger springs must be capable of supporting 52 pounds at 9½" extension. At 11⅞ inches, they must carry 78 pounds. Because the three springs are the main support of the tub unit in the Laundromat, they must be both load-supporting and vibrating springs.

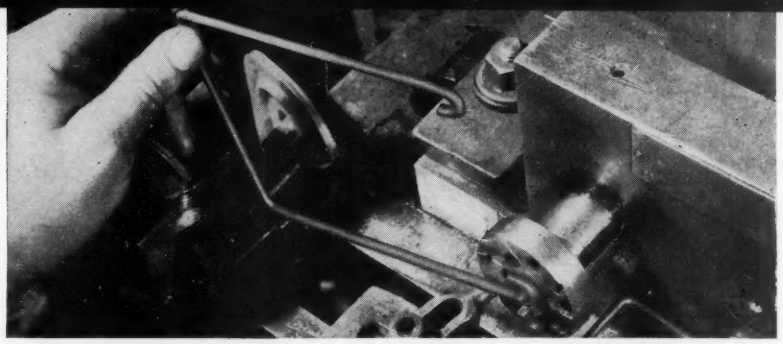
• **Surface Quality Counts**—If any of the three springs fails in use, the cost would be the expense of a complete dismantling to make repairs. That's why Raymond has installed a number of quality control inspections and tests throughout the production process.

Pittsburgh Steel also is Raymond's major supplier of hard-drawn, high-carbon MB wire. Pittsburgh Steel ships to Raymond tons of basic, bright, low carbon wire as well.

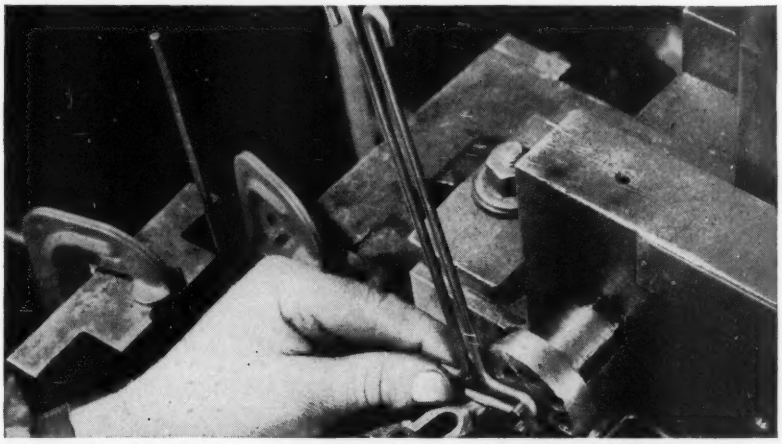
Raymond's experience with Pittsburgh Steel wire has been duplicated in many other plants across the nation.

Pittsburgh Steel's range of wire products can fit quickly, profitably into your operations. Its 50 years of experience in quality wire-making, its willingness to give service, its own extensive facilities and those of its subsidiary, Johnson Steel & Wire Company, can be the answer to your wire problem.

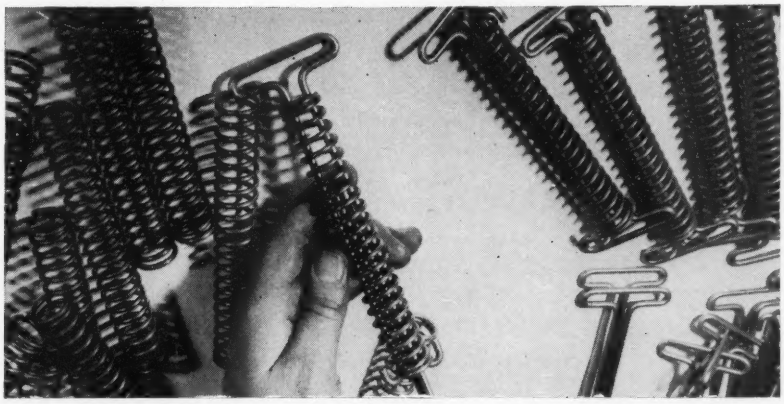
There's a national sales staff at your disposal. Contact any member of it today.



1. An 18⅝ inch piece of Pittsburgh Steel Company's .162 bright low carbon basic wire is hook wound on either end before being formed into a drawbar for extension spring on boat trailer.



2. Fourth and final forming operation in making drawbar is to form the loop.



3. Drawbars are inserted in opposite ends of 5⅞ inch spring to form unit. Spring is made from .105 hard drawn wire.

We're looking forward to seeing you...
at the 1956 annual convention of the Wire Association in Pittsburgh Oct. 29-Nov. 1, and hope you can make the scheduled tour of our plant.

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

District Sales Offices

Atlanta	Columbus	Detroit	New York	Tulsa
Chicago	Dallas	Houston	Philadelphia	Warren, Ohio
Cleveland	Dayton	Los Angeles	Pittsburgh	

Coming in October . . . . . the

ANNUAL CONVENTION of THE WIRE ASSOCIATION

THE TIME: October 29 through November 1, 1956

THE PLACE: Penn-Sheraton Hotel, Pittsburgh, Pennsylvania

FOR THE FERROUS DIVISION • • •

Twelve papers of outstanding interest have been selected by the Program Committee for the technical sessions. On Thursday morning a plant inspection trip to Monessen to visit the Rod and Wire Mills of Pittsburgh Steel Company is scheduled.

FOR THE NON-FERROUS DIVISION • • •

A similar number of papers relating to non-ferrous bare wire and electric wire and cable manufacture will be presented at the technical sessions. A plant visit on Thursday morning to the mills of the Copperweld Steel Company has been arranged.

SPECIAL FEATURES

ANNUAL LUNCHEON, WEDNESDAY—At this time the medal Award and Certificates of Honorable Mention will be awarded for the best papers of 1955. The 25-year Membership Certificates will also be presented. The Mordica Memorial Lecture, "Fulfillment of a Trust," Prepared by the late Kenneth H. Davis, Pres. K. H. Davis Wire & Cable Corporation will be presented by a member of that Organization.

ANNUAL MEETING OF ASSOCIATION, WEDNESDAY AFTERNOON — All Association members should attend. It is an opportunity to vote on matters proposed by the Directors, to offer your ideas as to what you want the Association to do and to hear what is going on.

ANNUAL STAG SMOKER-DINNER, WEDNESDAY EVENING — Don't miss this traditional affair. Fine dinner, good fellowship and a first class show.

See full, detailed program on pages 1011-1014

All persons active in the wire industry are cordially invited to the Convention.

— WRITE FOR HOTEL RESERVATION CARD —

THE WIRE ASSOCIATION

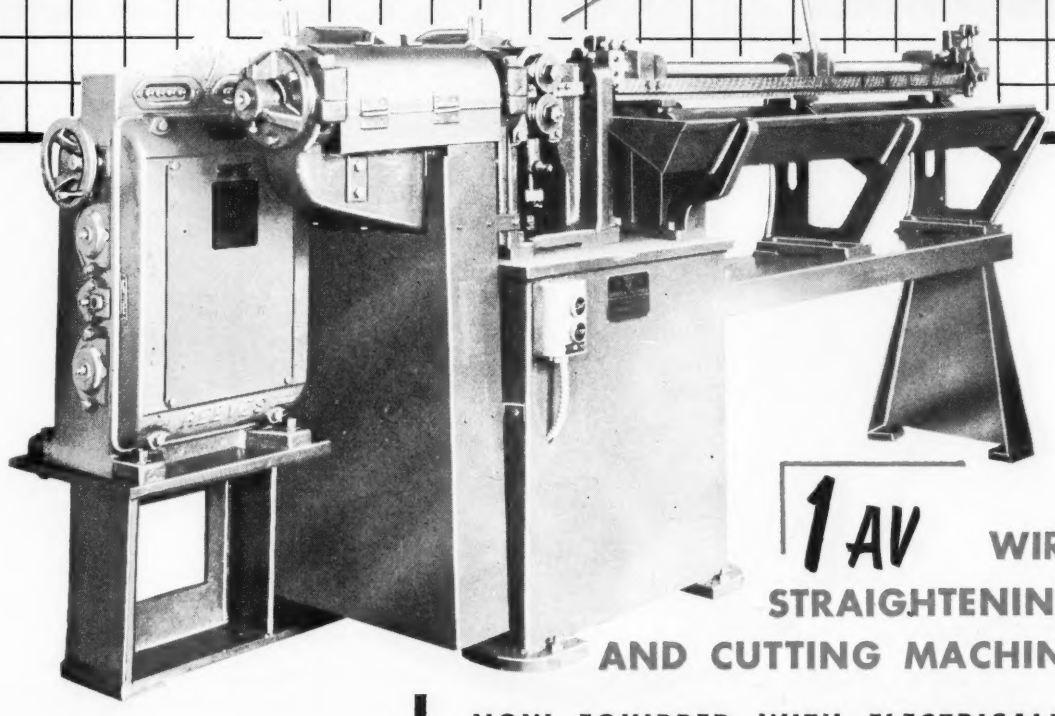
RICHARD E. BROWN, Executive Secretary

453 MAIN STREET • STAMFORD, CONN.

NEW! SHUSTER

LIGHTNING CUT-OFF

PRODUCTION BOOSTER



1 AV WIRE STRAIGHTENING AND CUTTING MACHINE

DESIGN ADVANTAGES

Micro-switch target and clutch
Lightning cut-off
Hardened steel cut-off knife delivers square, true, undistorted ends.
Direct-drive five-die straightening flier
Ball and roller bearings throughout

Other infinite variable speed machines for diameters up to 11/16" are available. Send for literature.

NOW EQUIPPED WITH ELECTRICALLY CONTROLLED TARGET AND CLUTCH!

Variable Speed — the speed you want when you want it! Geared to feed 50 to 200 feet per minute.

Constant Speed when set, regardless of load variations!

Infinite feed changes and control!

Minimum maintenance — frees operator from worry!

Straightens and cuts 3/32" to 1/4" **or** 1/16" to 3/16" diameter basic wire — real production flexibility!

Most economical machine of its kind! — both in original cost and maintenance!

Send for Bulletin #53

METTLER MACHINE TOOL, INC.
155 West Adeline St. New Haven, Conn.

For the FINEST Dies...

Specify

There Are Many Reasons Why V-R Leads The Field!

V-R NEW Cylindrical nib and improved method of assembly insure high degree of concentricity.

V-R . . . First in producing the only Tantalum-Tungsten carbide developed specifically for Drawing Dies.

V-R . . . First to manufacture Carbide Dies with preformed rough cored back relief.

V-R . . . First to furnish Carbide Dies rough cored to finish at hole sizes below .010".

WRITE TODAY for NEW Vascoloy-Ramet Die Catalog VR-461.

The New V-R Die Catalog gives complete ordering information on all V-R Dies for drawing wire, rod, bar and tube.

Vascoloy-Ramet CORPORATION

894 MARKET STREET

WAUKEGAN, ILLINOIS

The Wire Outlook

The agreements arrived at in steel circles set a pattern for wage and benefit demands in other basic industries that brought about relatively quick settlements.

Inventories were becoming dangerously low and their building up again has begun. It is a fact, however, that low inventories make for soundness and there is little chance now that topheavy inventories now can hang over industry as a threat to prosperity. The losers in the six-week strike are the wage earners and, of course, the steel producer. It is estimated that the industry lost over 300 million dollars in revenue and that labor sacrificed about 250 millions in wages. Unfortunately, these losses represent purchasing power.

The inevitable sharp price rise in steel will be felt in all industries and costs will go up for most products and services. By the time labor gets back on an even keel, its advantages will be eaten up in an increased cost-of-living index. Strikes are a poor way to settle differences.

Those who thought business was in for a real set-back this year might well be dumbfounded, for in spite of the strike and the poor showing of the automotive industry, business is still moving in high gear, with a very active second half in prospect.

It should not be inferred that we would have been better off without the production and wage losses. These are always serious. It does indicate a high degree of confidence in the future on the part of businessmen and the public and points up the fact that business is on a firm footing.

The supply of copper against demand has improved. In June there was a surplus for the first time in fifteen years. While the supply now is ample, a tightening later in the year is anticipated.

Nickel is not too free, in spite of large production increases. At present it is becoming profitable to mine low grade ores and some large new ore bodies have been discovered and are expected to be worked.

Zinc supply is plentiful and sales are increasing, although prices are expected to take a slight dip in the Fall.

The tin market has been upset by the Suez situation, since some 40 or 50 thousand tons pass through it annually. Prices are up and expected to climb further.

Merchant wire product inventories are in the main light, as compared with manufacturers' wire for wire products, fasteners, springs, etc. Wire product fabricators appear not to have suffered from shortages created by the strikes, although stocks were becoming depleted. A substantial pickup in the demand for wire for automotive uses is expected to start this month.

For the next fifteen years a tremendous increase in the use of electricity is anticipated paralleling the expanding use of electrical appliances in the home and the increasing of manufacturing facilities throughout the country, much of which has been apparent even to the casual observer. The growth in numbers of homes, their better equipment with appliances and the expansion of industry will call for vast quantities of electric wire and cable in the years ahead.

While the steel industry's first six months of this year set a new record for production, the year's total will be off. Business in general will be good and it now looks as though some new records of prosperity will be set before 1956 ends. Total industrial output should regain the levels of June by September, and then step up slowly through the balance of the year.

As we view it, it becomes more than ever necessary that the voters turn out in force to re-elect the incumbent administration for another four years. The midstream of a period of prosperity is a poor place to change horses.

—from the Editor's Desk

1 **Co-ordinated research, development and production**

. . . careful control of manufacture, through continuous research and testing, insures uniformity of all Steelskin products.

2 **Warehousing-in-stock supply**

. . . guarantees an adequate supply of the Steelskin products you need at all times — preventing possible production slow-down.

3 **Dependable performance**

. . . you can rely on the high, consistent quality of our products. Our men are in the field, on call, to help with any of your wire drawing problems.

here's why you can rest assured when you rely on...

STEELSKIN

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WIRE
AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
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Wire Flattening

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For this paper the author received an award for this practical contribution to the cold forming of wire into flat sections. It was presented on April 17, 1956, at the Staff School of the Caledonia Works of Frederick Smith & Co. Wire Manufacturers Ltd. and is published with their permission and through their courtesy.

Introduction

There appears to be far less scientific investigation into the problems of producing flattened wire than there is into wiredrawing. The technical information available in the form of articles in the trade periodicals for the most part deal only in a general way with the subject. A possible reason for this is that Flattened Wire production is in the nature of a side-line in wire manufacture and is not thought to merit the same attention and investigation as wiredrawing. The fact remains, however, that little information is to hand.

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The following notes are therefore written with some misgivings, bearing in mind the writer's limitations in the field of scientific research and higher mathematics. The object has been to set down on paper some personal experiences and problems associated with Flat Wire production in general, from which it is hoped to draw some logical conclusions.

General Specification For Flat Wire

For the purpose of this paper the demand for Flat Wire has been broadly divided into two categories:

(a) **Hard Rolled.**
Flat wire with a definite tensile strength and carbon content used for Driving Chains, Springs, Screw Nuts, etc.

(b) **Inter-annealed.**
Flat Wire possessing a high degree of ductility suitable for forming, shaping and bending.

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Flat wire in the former category is usually produced by hard rolling to the finished size; the specified tensile strength and size governing both the choice of carbon content and the amount of reduction or cold work to be given to the base material. In cases where the section required calls for a light reduction which would not be sufficient to achieve the required tensile strength starting from a hot rolled rod (Patented or Unpatented), the base material should be specified as a drawn wire with a tensile strength only slightly below that required in the finished product in order that the further cold working of flattening may bring the tensile into the stipulated range. For instance, due to the heavy reduction involved a section 3/8″ x .020″ with a tensile of 90/100 tons per square inch could be produced by rolling from a .252″ patented rod of appropriate carbon content. On the other hand, for a size 1/8″ x 1/32″ with a tensile of 115 tons per square inch, one would require a base material of about .070″ round wire with a drawn tensile strength of 105 T.P.S.I., this smaller reduction by flattening increasing the U.T.S. to 115 tons per square inch.

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The second category consists of rolled low carbon mild steel, usually within the range of 20/50 tons per square inch and with a high degree of ductility. Unlike the former category, where the overall reduction is used to impart tensile strength, reduction in this case is in the main only used to produce the size and finish demanded; the required ductility is obtained by suitable inter-annealing, increasing or reducing the amount of reduction given after annealing to suit

the temper required. It is possible to draw up a temper rolling graph with reductions in height per cent plotted against increments of Brinell Hardness in order to standardise temper rolling practice.

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Due to the lighter reductions which must be used to produce wires with a low width/thickness ratio, it is often necessary in such cases to use annealed or mild drawn base wire for rolling to the required size and temper.

Raw Material

Three types of base material are used for the production of Flat Wire, these are:

(a) Drawn wire (Hard drawn, mild drawn or annealed).
(b) Round Hot rolled rods.
(c) Flat Hot rolled rods.

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Drawn wire could be used as the base material for all the size range of flattened wire normally undertaken and, in fact, for most flattened wires with a width of 1/4″ and less, drawn wire must be used since rods below .212″ diameter are not available and excessive flattening reductions serve no purpose other than to increase costs. However, in the size range requiring a base material of .212″ or more, it is advantageous to use Hot rolled rods since this eliminates the wiredrawing costs entirely. The fact that the greater ductility and open grain surface of scale free rods allows heavier reductions in the initial stages of rolling multi-pass work, further increases the advantages of using hot rolled rods wherever possible.

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It is not necessary that round rods be used for all the size range requiring rods as a base material; the use of flat rods offers a distinct advantage in the production of the heavier sections such as 3/8″ and 16G. and over—in that spread can be discounted as a factor in deciding the base size, and it then becomes possible to produce Flat wire by a specified reduction in height. Assuming that a 40% Reduction in Height from the base to finished size would produce the necessary finish and gauge limits, this 40% R.I.H. could remain constant throughout the size range, making draftings and number of passes to be given a fairly simple matter. For instance, a finished size of 3/8″ x 1/16″ would be reached from a base rod of 3/8″ x 11 S.W.G. and for 3/8″ x 1/8″ the base rod would be 3/8″ x 5 S.W.G.—both reductions in height being approximately 40%. In cases where the reduction is used to achieve a specific tensile strength in the finished wire this method can be quite successfully adopted. The reduction in height per cent is under control, therefore base sizes which will be given the correct reduction to produce by work hardening the required tensile strength in the finished wire can be accurately selected.

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With the use of round rods, however, the reduction in height per cent to be given to achieve a finished size cannot be accurately pre-determined because of the effect of the spread of the material in rolling, and total reductions in height will vary according to this spread factor; for instance, a finished size of 3/8″ x 1/16″ would be produced from a base round rod of .252″—a total R.I.H. of 75% being involved, whereas a finished size of 3/8″ x 1/8″ would be rolled from a base size of .300″ with a total R.I.H. of only 58%.

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There is however an advantage in using round rods in preference to Flat rods in that round rods can be fed into the machine from a flipper with all its advantages, whereas no satisfactory similar method of feed has yet been devised for the use of Flat rods.

Preparation of Rods for Rolling

In order to obtain a good finish it is necessary that the rods be perfectly clean, dry and free from scale or lime, before rolling since such adherents tend to become rolled into the surface of the wire being produced and can only be removed by further heavy rolling reductions. The difficulties of producing rods in that condition by an acid pickling process are such that the possibility of mechanical de-scaling should be thoroughly investigated before resorting to the former method.

Action During Rolling

Between the point at which the ingoing wire strikes the roll and the point where the outgoing wire leaves the roll (which for the sake of this article is assumed to be directly below the roll axis) the wire undergoing reduction subtends an angle of the roll diameter—the arc of this angle being termed the contact arc. In the initial stage of the contact arc the rolls slip over the wire undergoing reduction, but at some point along the contact arc the rolls cease to slip over the wire due to the action of friction between the rolls and the wire; the point where this roll slip ceases is termed the friction angle and although extremely difficult to measure, due to the assessment of the friction value of both roll and wire, it is logical to assume that without friction rolling would not take place.

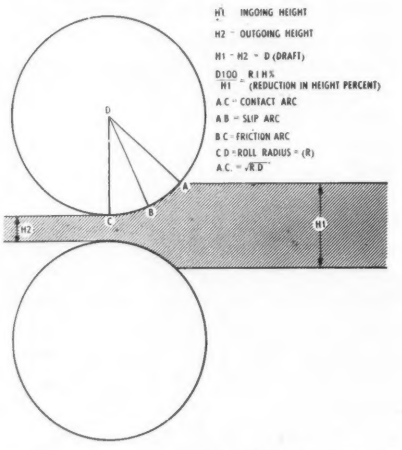

Fig. 1. * * * * * * * *

Skidding

When the contact arc is less than twice the friction arc (i.e. that part of the contact arc wherein slip does not occur) rolling takes place; when this is not the case, however, the rolls skid over the wire, spoiling the product and surface of the rolls by the heat generated. To overcome this defect the balance between friction arc and contact arc must be restored either by increasing the friction arc, i.e. using rough surfaced rolls

or open grain surface wire, or by reducing the contact arc, i.e. reducing the drafting or increasing the roll diameter.

Factors Limiting Draftings

It can be seen, therefore, that since the friction angle governs the maximum draftings which may be used, it is an advantage to have a high friction value in the initial stages of rolling a multipass flat wire in order to increase the draftings and so reduce the ultimate number of passes required to achieve a given size. It has been found in practice that greater reductions are possible on a wire free from soap coat than one drawn with the usual soap, since the coating of soap and lime reacts in the manner of a lubricant and reduces the friction-angle. Conversely, it is widely known amongst wire flatteners that greater draftings can be achieved on rolls roughened by having been in use some time than can be accomplished on a similar pair or rolls newly ground and polished; this, of course, is due to the higher friction value of the rough rolls.

Contact Arc and Draftings

The contact Arc can be calculated from the formula $\sqrt{\quad}$ RM

where R = Roll radius
M = Draft

and it can be seen from the formula that draft in the form of thous. reduction remains constant for the same contact arc and roll radius irrespective of the height of the ingoing wire which is not a part of the equation. Any increase or decrease in the ingoing height will merely increase or decrease the roll gap which is the height of the outgoing wire. This has the effect of lessening the reduction in height per cent achieved on wires with a greater ingoing height for the same contact arc as the following examples demonstrate:

Roll Diameter = 4″
Base Wire Ingoing Height = .100″
Draft = .050″
Contact Arc = $\sqrt{2 \times .050''}$ = .316″
Reduction in Height % = 50% R.I.H.

Increasing the ingoing height to .150″ for the same draft gives the following:

Roll Diameter = 4″
Base Wire Ingoing Height = .150″
Draft = .050″
Contact ARC = $\sqrt{2 \times .050''}$ = .316″
Reduction in Height % = 33.1/3% R.I.H.

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If in the latter example the contact arc could not be increased by reason of its relation to the friction angle, previously explained, a 50% R.I.H. drafting could not be undertaken without increasing the roll size. The significance of this point should be borne in mind in the selection of roll size when heavy drafts are necessary on wires with a large ingoing height.

Rolling Surface Wear

It will be appreciated that flattening rolls are subject to wear, the roll surface loses its polish and eventually becomes ridged or marked; since the wire finish can only be equal to the roll surface condition, the quality and finish in the product deteriorates and, due to uneven roll surfaces, wire may eventually be produced with "side bias" and "dog legs" which of course would be entirely unsuitable. In order to avoid this the rolls should be re-ground to restore the correct camber and polish. Numerous grinds will reduce the diameter of the rolls and so shorten their life, in addition to increasing maintenance charges, so that any increase in the length of time between grinds is advantageous.

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Broadly speaking, the rate of roll wear can be affected by three main factors:

(a) Draftings.
(b) The wire's resistance to deformation (i.e. tensile strength).
(c) The surface hardness of the rolls.

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It follows that the greatest roll wear will occur with heavy draftings on high tensile wire with low surface hardness rolls. Draftings can, of course, be adjusted according to the tensile strength of the wire being rolled, and by careful choice of draftings roll life can be considerably lengthened for a given condition of roll hardness. If, however, the roll hardness itself can be considerably increased draftings become of secondary importance in roll life; this is, in fact, achieved by the use of Tungsten Carbide inserted rolls which, owing to their extreme hardness, result in an indefinite period of time between grinds. Providing the rolling surfaces are highly polished the same high quality of finish may be obtained as with steel rolls at their best.

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A pair of Tungsten Carbide inserted rolls have been in continuous production for over three years, with no apparent deterioration in either the roll surface or the finish obtained by their use in rolling coppered, galvanised and bright wires, with tensiles of up to 100 tons per square inch.

Spread

During the course of wire flattening, the width of the wire — which in the case of round wire is the diameter — increases or spreads. This latter must be allowed for by wire flatteners in deciding a base round wire size; in general practice round base wire diameters are somewhat less than the final wire width required, the spread action being used to achieve the necessary width.

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There are several factors which govern spread, each factor having a different valuation to the others in its relationship to and effect upon spread. The most important of these factors are:

(a) Drafting.
(b) Roll diameter.
(c) Wire tensile.
(d) Friction angle.
(e) Back tension.
(f) Width/thickness ratio of ingoing material.

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Generally speaking the following rules hold true for wire flattening:

increased drafting increases spread
increased roll dia. increases spread
increased tensile strength increases spread
increased friction angle increases

spread
increased back tension reduces spread
increased width/thickness ratio reduces spread.

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The exact amount of influence which each of these factors has upon spread does not come within the purpose of this paper, however, it can be stated that providing the value of each factor remains constant spread will also remain constant; if, however, the value of any factor is changed the effect will be an increase or decrease in the resultant spread. The possibility of arriving mathematically at a correct base size for any multi-pass work where so many variable factors have an unknown influence is open to conjecture; it is indeed doubtful if any two wire flatteners use exactly the same base round size for a particular flat wire, because it is unlikely that the factors involved will match up precisely.

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In order to reduce the hazards of guess work in deciding base sizes, and at the same time to control wire width, it is suggested that hand operated idling edge rolls be fitted on the entry side of the rolls of all passes subsequent to the first pass. This enables pressure to be applied to the width of the wire undergoing reduction and so brings the width under control and at the same time gives closer width tolerances and a smooth polished finish to the edges of the product. If such edge rolls are installed it is possible to increase slightly the base round wire size of multi-pass jobs to allow for edge rolling; whilst the factors governing spread are not entirely eliminated they are under greater control and the danger of small width wires is reduced.

Continuous Rolling

The principle of continuous rolling is similar to continuous wiredrawing in that it is to undertake the whole reduction, from base size to finished size, in progressive and simultaneous reductions by passing the material through rolling machines which are set in "line astern" formation. The advantages of this method of production are so obvious as to need no further comment and providing the roll stand is carefully selected with regard to the work it will be called upon to perform no disadvantages should arise.

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The factor governing successful continuous reductions in either wiredrawing or rolling is to maintain a balance between the intake and output of the wiredrawing blocks or rolls, so that a steady even flow of material is produced to feed the succeeding reduction unit. It is possible to achieve this by suitable gearing to the individual reduction units, and then by calculating the draftings to suit the gearing in order to ensure that a specific measurement of wire will pass a given point in a specified length of time and so give a steady feed to all reduction units throughout the stand.

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In wiredrawing this is a fairly simple matter of mathematical calculation, since the shape of the material being produced is round from base to finished size and the only calculation necessary is the amount the material is to be reduced in size (and therefore elongated) at each particular drafting. The reductions in size are usually expressed as a percentage reduction of area. Any deviation from the drafting formula which may be encountered can be overcome by the build up of wire on the intermediate blocks. Due to this ability to build up or hold a reserve supply of wire for the succeeding hole a degree of latitude is permissible in draftings.

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With flattening, however, this principle cannot be used due to the problems of wapping-off and the fact that the block is used mainly to wind up the wire produced by the rolls and does not supply the motive power as in wiredrawing. It is, therefore, imperative that the correct balance of output and intake be maintained at all stages and throughout the whole size range to be undertaken despite the following facts:

(a) Total reduction cannot be calculated as a percentage of the original cross sectional area due to the action of spread.
(b) The total amount of reduction in height from base to finished size will not be constant but will vary from size to size.
(c) The amount of spread encountered during rolling will vary according to the size, quality and reduction undertaken.
(d) The shape of the material undergoing reduction will be transformed from round to rectangular.

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These factors preclude the use of fixed ratio gearings for each pair of rolls in a stand.

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Under these conditions, therefore each pair of rolls should be driven by an individual motor capable of variable speed and controlled by a rheostat, in order that the ratio of speeds between the whole stand may be adjusted to suit the particular size undergoing reduction. The interpass dimensions must then be measured or calculated and the matching speeds in feet per minute transposed into roll revolutions per minute; and the rheostat settings for each individual pair of rolls could thus be adjusted before commencing rolling.

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As a precaution against wire variations and power fluctuations between stands, there should be fixed between each stand a jockey pulley which will ride on the wire passing from stand to stand and which will, according to its position, operate the rheostat control. Should the wire sag due to the output of any one stand being too great, the pulley will lower with it and in its downward motion should react on the rheostat controlling the preceding pair of rolls, so reducing the speed. The opposite will occur should the wire tighten due to output of the preceding rolls being too low; the upward movement of the jockey pulley would automatically effect an increase in the roll revolutions and thereby raise the output of the stand concerned. An even, automatically controlled, balance would thus be achieved throughout all the stands and providing that the whole surface of the material—both width and thickness—is under close con-

trol at all times, production can be on a continuous basis without difficulty.

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The following examples show draftings and machine speeds—assuming a 5 stand 6″ diameter roll with variable speed gearings; these two examples are chosen for their disparity in size, spread and reduction. In each case a finishing speed of 500 feet per minute is required:

	A	B
Required Size	3/8"x16 S.W.G.	3/16"x26 S.W.G.
Round Base	.258" Round Wire	.118" Round Wire
1st Pass (thous.)	$\frac{+37 \quad -87}{.295" \times .171"}$	$\frac{+22 \quad -46}{.140" \times .072"}$
2nd Pass "	$\frac{+31 \quad -51}{.326" \times .120"}$	$\frac{+17 \quad -18}{.157" \times .054"}$
3rd Pass "	$\frac{+24 \quad -28}{.350" \times .102"}$	$\frac{+15 \quad -18}{.172" \times .036"}$
4th Pass "	$\frac{+16 \quad -20}{.366" \times .072"}$	$\frac{+10 \quad -12}{.182" \times .024"}$
5th Pass "	$\frac{+9 \quad -8}{.375" \times .064"}$	$\frac{+5 \quad -6}{.187" \times .018"}$
Reduction in Height (-)	75.5%	85%
Spread (+)	45.5%	58.5%
Roll Diameter	6"	
Roll Circumference (6" x 3.14)	18.84"	
Finishing pass speed	500 F.P.M.	
Finishing pass Roll Revs $(\frac{500 \times 12}{18.84})$	318 Revs. per min.	

In order to calculate the inter-pass running speeds, it is necessary to know the weight of wire which will pass through the rolls per minute; this can be discovered by finding the weight of 500 feet of the finished wire size by the formula:

Width x thickness x length in feet x 3.4

3.4 being taken as the weight in pounds of 1 foot of 1″ square steel. In the case of the .375″ x .064″ wire (example A) the weight passing per minute would be .375 x .064 x 500 x 3.4 = 40.8 lbs.

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Each roll must, therefore, produce 40.8 lbs. of wire, although the wire dimensions are changing with each pass. Once the dimensions are known it becomes an easy matter to calculate the length to be produced by each roll in the following manner:

$$\frac{\text{Lbs. Wt.}}{\text{Width x Thickness x 3.4}} = \text{Feet Length}$$

Thus the length of .366″ x .077″ would be:

$$\frac{40.8}{.366" \times .077" \times 3.4} = 425 \text{ ft.}$$

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If this feet length is then divided by roll diameter the required revs. to take up 40.8 lbs. of .366″ x .077″ is thus obtained:

$$\frac{425 \times 12}{18.84} = 270 \text{ revs.}$$

Extending this to cover the 5 passes for each of the previous two examples gives the following revs. per minute per pass for each size (See table at right above).

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In practice it would be advisable to increase the running speed for the smaller wire due to its smaller contact areas, or possibly reduce the running speeds of the heavier wire for the opposite reason; this, of course, is dependent upon the roll diameter installed.

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With flattened wires requiring a base material of less than .144″ diameter, and where in the heavier sizes—say down to .080″ diameter —the width/thickness ratio does not exceed 4 to 1, it is possible to achieve the overall reduction normally required in 3 passes instead of 5; thus a 3 stand continuous mill would be capable of producing to a wide range of sizes. Such a mill has already gone into production and is capable of producing 3/16″ x 1/16″ down to 3/32″ x 1/64″ with many possible combinations between the two sizes, including of course stitching wires.

	Size	Ft. per Minute	Revs. per Minute	LBS/MIN.
	.375" x .064"			
1st Pass	.295" x .171"	238	152	40.8
2nd Pass	.326" x .120"	307	195	"
3rd Pass	.350" x .092"	372	237	"
4th Pass	.366" x .072"	455	290	"
5th Pass	.375" x .064"	500	318	"
	.187" x .018"			
1st Pass	.140" x .072"	166	105	5.7
2nd Pass	.157" x .054"	199	126	"
3rd Pass	.172" x .036"	272	174	"
4th Pass	.182" x .024"	384	232	"
5th Pass	.187" x .018"	500	318	"

Rolling Heat

The amount of heat generated during the rolling process is in ratio to the drafting, friction angle and speed of rolling. The higher these values are, the greater will be the temperature of the rolls and wire; in the case of continuous rolling, temperatures in the later passes are higher than they would be under similar conditions on a single stand machine, since the wire does not have time to return to room temperature between passes.

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When steel or chilled iron rolls are used the heat which is trans-

mitted to the rolls expands there and so reduces the roll gap, causing the wire thickness to be undersize. This sinking can be overcome by fitting internal water cooling to each roll; a continuous stream of water is fed directly through the roll centres and then led away totally enclosed to avoid splashing the wire. This has the effect of reducing roll temperature considerably; a specific case is on record where a 4" roll running at 450 revs. per minute with a temperature of 70°C. was reduced to 30°C. by this method. Much improved thickness tolerances over longer runs were thus obtained.

Lubricant

The effect of lubricant on the wire undergoing rolling is to slightly reduce the friction angle and thus the temperature of the wire being rolled; and dependent upon the constituents of the lubricant it can improve the finish and rust resisting properties of the flattened wire. The use of lubricant is, therefore, advisable except in cases where heavy draftings are permissible—such as 1st pass rolling of hot rolled rods on a continuous mill when the open grain surface of the rod is utilized to increase the friction angle and so the drafting permissible.

Rolling Load

When a wire is undergoing rolling reduction, pressure is applied to accomplish the reduction. The pressure, which acts through the roll bearings, is in ratio to the draft undertaken and the wire's tensile strength or resistance to deformation. The greater the drafting, the greater is the pressure required to effect the reduction; similarly the higher the tensile strength, the greater is the pressure required. This pressure can be termed rolling load and its assessment is important when deciding the power units for driving the rolling mill.

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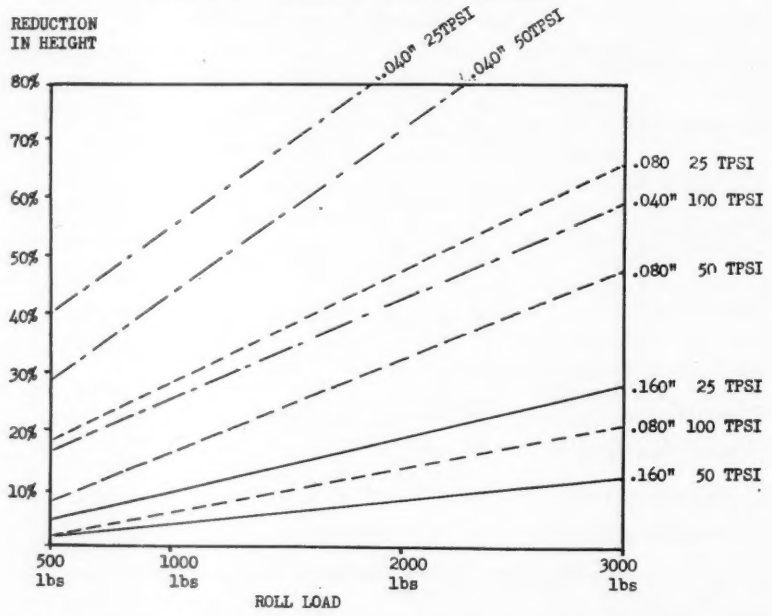
In order to learn more about rolling loads a series of rather rough experiments were carried out on a rolling machine using 4" diameter rolls mounted in roller bearings. Three wire sizes were chosen—.160", .080" and .040"—since these were in direct ratio to roll diameter and to each other, and three tensile strengths of 25, 50 and 100 T.P.S.I. were used for each size, making nine samples in all. Each sample was rolled using in turn rolling loads of 500, 1000, 2000 and 3000 lbs. mounted on to the top bearings. The results were plotted as reductions in height per cent against pounds rolling load (see appendix I).

APPENDIX I.

REDUCTIONS OBTAINED WITH VARIOUS ROLL LOADS



It should be stressed that these experiments were carried out under normal mill conditions and were performed merely to give a rough guide to the rolling load, in order to assess the motor power required to drive the mill under the varying conditions applicable. From the graph it can be seen that a 4" diameter roll with a 3000 lb. roll load will give a reduction of 12% on a .160" diameter wire of 50 tons tensile and reduction of 66% on a .080" diameter wire of 25 tons tensile. If a power unit which will take a 3000 lb. roll load is used the maximum drafts permissible for the wires plotted can be read off the graph, and, if required, interpolations can be made for other sizes and tensile strengths within the range. It will be seen from the draftings obtained on the smaller wires with the lower tensiles that it would be advisable to produce these on a machine with a lower maximum rolling load and motor power; and since it was not possible to roll .160" diameter 100 T.P.S.I. wire at all, a roll load well in excess of 3000 lbs. is required.

Pay-off and Take-up

If maximum machine efficiency is to be obtained both loading and stripping times should be reduced to a minimum. Where round wire or rod base is in use on continuous rolling it is usual to feed from flippers upon which the welding together of coils can be effected with the plant in operation, thus ensuring a continuous feed to the reduction unit. The kinking which results from the wire turning over as each wap straightens out does give rise to dog legs in the first pass, but these can be removed subsequently by the edge rolls of succeeding passes.

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A further advantage lies in the fact that the flipper does not "over-run" as can be the case with the revolving type of swifts; for this reason it is ideally suited for use where the rolling plant is fitted

with an automatic stop or cut-out to the power unit for the purpose of producing to a standard running time or to a constant weight of coil (this is an aspect of production planning which is referred to later). The use of flippers for feeding to one-pass flattening is not advisable, due to the fact that the effects of the kinking which takes place cannot be eliminated entirely in the one pass.

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The winding block on a rolling machine, unlike a wiredrawing block, does not supply the motive power; it is used only to wind up the material produced by the rolls —usually in traverse wound coils —and must, therefore be synchronized to the finishing rolls. This can be accomplished by the use of a jockey pulley as in the case of the intermediate rolls, but here the pulley will react on the winding block motor; thus the take-up speed will remain constant despite the fact that the coil is increasing in diameter during rolling.

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A correct amount of tension is necessary during winding if a neat appearance is to be obtained in the finished product. Too little tension gives rise to loops and "crossed" waps, and the whole finished coil sags during handling; whilst too much tension causes breaks and snatches when the machine is running. It is obvious, of course, that different wires will need different tensions in order to produce a neat coil, and to provide for this it is desirable that the jockey pulley between the finishing rolls and the winding block be capable of being increased or reduced in weight by means of dead-weight attachments to make possible the necessary adjustments in winding tension.

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In order that the flattened wire be wound evenly over the full width of the coil it is necessary that either the wire or the winding block be traversed, and that the traverse pitch be capable of adjustment to the width of the wire being wound; it has been found in practice, that it is better to traverse the winding block itself rather than the wire, due to the possibility of side bias occurring when the wire is traversed. The distance between the block and the final rolls also affects winding, and the best results are obtained when it is at a minimum.

APPENDIX II

PRODUCTION CHART

Based on 18 mins. running time and 2 mins. stripping time (20 mins. cycle)

WEIGHT PER MINUTE	SPEEDS IN F.P.M. MAXIMUM CROSS SECTIONAL AREA						COIL WEIGHT	COILS PER HOUR	PLANNED PROD. PER HR. PER M/G
	1000	900	800	700	600	500			
5 lbs	.00147"	.00164"	.00184"	.0021"	.00246"	.00294"	90 lbs	3	270 lbs.
6 lbs	.00177"	.00197"	.0022"	.00252"	.00294"	.00354"	108 lbs	3	324 lbs.
10 lbs	.00294"	.00328"	.00367"	.0042"	.0049"	.00588"	180 lbs	3	540 lbs.

The Rolling Unit

There is some variation in the type of rolling plant required for the many sizes and types of flat wire which are produced by rolling. The selection of the correct unit for a particular flat wire is necessary if high quality work is to be produced in an efficient manner. Analyzing the size range from 1/32" x 1/64" up to and including 1" x 3/16" it is possible to divide this range roughly into four groups.

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The 1st group consists of the heavier sizes from 1/2" x 1/16" up to the maximum size which is quoted here as 1" x 3/16"; in the main the base material would be flat rods and the number of passes required to undertake the reductions could be standardized at three. In the 2nd group the sizes range from 3/16" x 1/32" up to 1/2" x 1/16"; the base material could be either drawn round wire or hot rolled round rods with the number of passes required standardized at five.

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The 3rd group includes all the sizes from 3/64" x 1/64" up to 3/16" x 1/16"; the base material will be drawn round wire and the passes again standardized at three. The final group covers all the sizes below 3/64" x 1/64". Only one pass would be required and the base material would be exclusively drawn wire.

With this type of grouping it is possible to design and build suitable machinery for each group. For the 1st group a 3 stand continuous mill with 8" diameter rolls and 6" edging rolls should be sufficient, whereas for the 2nd group a 5 stand continuous mill with 6" diameter rolls and 4" edging rolls could be used.

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The 3rd group could be a further 3 stand continuous mill but built somewhat lighter than for the 1st group and equipped with 4" diameter rolls and 2" edging rolls. The final group requiring one pass could be incorporated into the wiredrawing machine by inserting a pair of hand adjusted idling rolls between the last die and the block. A roll diameter of 2" should be sufficient to achieve the light draftings called for in this class of work and, providing an efficient roll cooling system is installed, speeds up to 2000 revs. per minute should be possible.

Drive

In the 1st and 2nd groups, where the roll gap will be relatively large, it is an advantage to use universal couplings between the driving pinions and the rolls in order that a wide range of thicknesses may be rolled while still retaining correctly meshed pinions. It has been discovered in practise that imperfections in the pinion meshing can be transmitted to the wire being rolled, causing ripples or waves and spoiling the product. This rippling was accentuated when rolling wires less than .025" thick. In the 3rd group where the roll gap will not have such great fluctuations, it is possible to fit the

(*Please turn to page* 1053)

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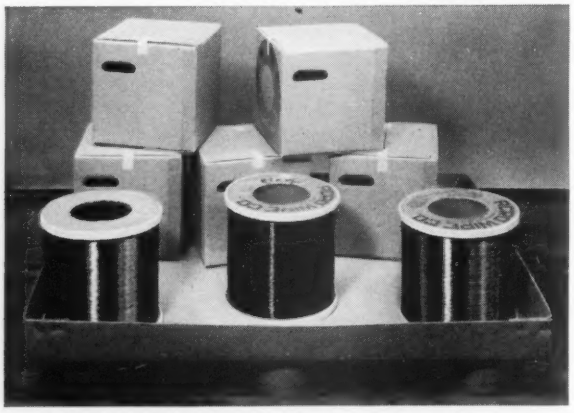
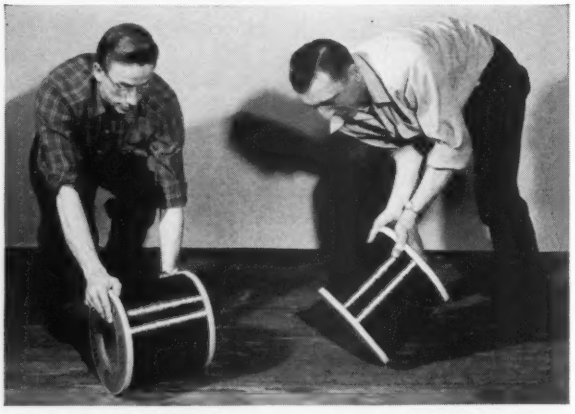
– Acrometal's low-cost process of packaging wire on a NON-returnable reel

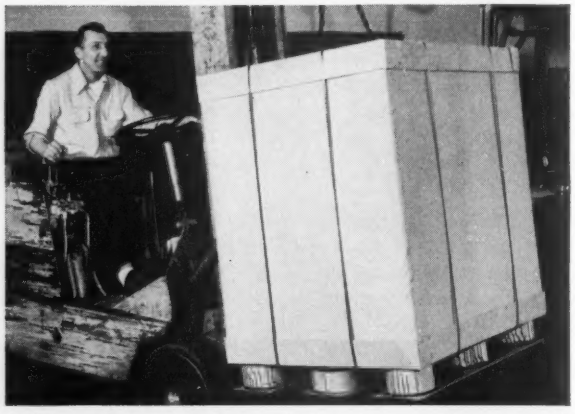


Look at these big packages—50 lbs., 100 lbs.

Wound evenly with minimum spreading.
We furnish Adapter and Handling Equipment.



Tight and solid! No damage, no snarls or wire loss even after rolling or bouncing.



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It's REVOLUTIONARY – but we are steadily equipping more and more plants month by month

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ACROMETAL PRODUCTS, Inc.

616 Fifth Street North Minneapolis, Minnesota

The Barbed Wire Story

This third in the series of "Pioneers of the Past" stories, commemorating the 125th anniversary of the American Steel and Wire Division of United States Steel Corporation, adds an interesting chapter to the wire industry's Americana. It is published here through the courtesy of the company.

This is the story of a practical, prosaic product . . . barbed wire . . . and the surprisingly important role it played in the winning of the west, the growth of the wire industry in this country during the late 1800's, and in the formation of American Steel & Wire.

★ ★ ★

On second thought, perhaps it isn't so surprising that such an important part in history was entrusted to a product as tough and durable as barbed wire. Surely, if ever a wire product was fitted for the job, in those rough and tumble days, it was barbed wire.

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Let's go back in time to the days when the West was being settled by that rugged, hardy breed of American . . . the homesteader. It was in 1862 that the Government's Homestead Act started a flood of pioneer settlers to the West. When these pioneers from the wooded, hilly regions of the East came into the Plains, they at first avoided the open country, although often it was the most fertile, for the very good reason that there were neither stones nor trees for fencing material.

★ ★ ★

Fence was necessary for the homesteader to protect his crops against both range cattle and wild animals. Sheep raisers also needed fence. Great herds of wandering cattle tramped down vegetation, ruined water holes, and made large tracts of land useless to mutton and wool raisers. Consequently, the pioneers picked out sites near streams where there were wood lots.

★ ★ ★

The West was filling up so rapidly that before long, the problem of fencing became extremely acute. For a period, the settlement of the vast Plains was slowed down until a satisfactory cheap fence material could be found. This, in turn, delayed the tremendous spurt given to eastern industries when the full settlement of the Plains created a market for manufactured products.

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Thus, it may be no exaggeration to say that the economic progress of America marked time for some years until the western fence problem was solved by the appearance of barbed wire.

Fence Problem Was Crucial

It is diffcult for us to realize today how crucial the fence problem was to thousands of Americans in the Plain States. To import lumber and build wooden fences was prohibitively expensive. It cost as much as $1,000 to fence a small farm, and $1,000 to a homesteader was a lot of money. Besides, wooden fences deteriorated quickly.

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Newspapers, farm journals and agricultural societies energetically discussed the vexing problem of fences . . . the materials to use, how to make them, costs, and the relative merits of each kind of fence then known. In 1871, the Department of Agriculture estimated the cost of fences in the United States to be $1,748,000,000 . . . nearly equal to the national debt.

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The fencing problem was of national interest, as may be seen from the following article, entitled "An Old Complaint," which appeared in the American Agriculturist as early as 1855:

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"Strange as it may seem, the greatest investment of the country, the most costly production of human industry, are the common fences which divide the fields from the highway, and separate them from each other. No man dreams that when compared with the outlay for these unpretentious structures, our cities and towns with all their wealth are left far behind."

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The problem was summed up in a report of the Iowa State Agricultural Society in 1859:

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"What shall we do for fences is a question that is asked of every intelligent stranger who visits and looks over our State.

★ ★ ★

"On many portions of the State, timber is almost exhausted, and the efforts made to produce artificial groves are so few in number and limited in extent, that we may put them down as nothing . . . Meanwhile our present fences are rotting down and we are waiting in doubt, with what to replace them. It becomes us, as farmers, to look the question in the face."

Invention of Barbed Wire

It was a farmer, Joseph H. Glidden of DeKalb, Illinois, who looked the question in the face, and gave the most practical answer. His particular form of barbed wire was the most widely used for half a century.

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It is of interest that the idea of barbed wire was copied from nature. It was borrowed from the thorns on hedges, which were grown and then woven around plain wire and board fences to discourage cattle from attempting to break through. The first crude application of the idea was in the form of points, or barbs, of wire, projecting from a strip of wood which was hung down at intervals from the fence.

The first such device was patented on April 2, 1867, by Alphonzo Dabb, of Elizabethport, New York. The same or similar ideas to improve fencing was apparently in many minds at that period, and further patents were taken out with slight variations by other men.

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The novel idea of attaching the barbs directly to the wire itself, instead of on suspended strips of board, occurred to two men at almost the same time . . . Joseph H. Glidden, and Jacob Haish, also of DeKalb, with Glidden slightly in the lead.

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Glidden filed an application to patent his barbed wire on October 23 and Haish on December 22, 1873. Haish claimed that he was marketing his brand of barbed wire with an S barb long before a patent was issued to him, while Glidden was still struggling with his crude methods.

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In an effort to establish his claim, Haish engaged in angry litigation for some 20 years until a decision of the U. S. Supreme Court in 1892 ruled that Glidden had the prior invention.

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It is said that Glidden used the first barbed wire he made to string on his DeKalb farm. The barbs were made separately by hand on parts of a coffee grinder and then strung at intervals on a wire, suspended between a tree and the axle of a grindstone. A second strand of plain wire was placed parallel to the first. By turning the crank of the grindstone the two wires were twisted together securely holding the barbs in place.

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At first, Glidden's wire was made in 16-foot lengths, and since it apparently never occurred to him to coil the wire on spools, as was later done, the wire was carried to the point of use and the 16-foot lengths were spliced together. When Glidden started to make barbed wire, three boys and two men could turn out 50 pounds a day. Next year, by arranging to have horse power twist the wire, the production of five persons was stepped up to 150 pounds a day.

John W. Gates

Barbed wire, at first, met with opposition from farmers and cattlemen, who feared that the barbs would injure their livestock.

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It was one man who opened up the market for barbed wire in Texas. He was the fabulous John W. "Bet-A-Million" Gates, who rose from a poor Illinois farm boy to become a dominant figure in the wire industry of this country, and the principal organizer of the American Steel & Wire Company. After several business ventures of his own, he became, at 21, a barbed wire salesman for his uncle, Isaac L. Ellwood.

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Ellwood, a hardware dealer in DeKalb, had bought one-half interest in Joseph Glidden's patent for $265. The two men formed the Barb Fence Company and bought up earlier patents. Their company was the largest manufacturer of barbed wire at that time.

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Ellwood's salesmen had been unable to crack the Texas market for barbed wire. Cattlemen scoffed at it—said it would injure the cattle and besides wasn't strong enough to hold them in. Salesmen who ventured on to the ranches to see the owners were sometimes chased off by revolver-waving cowboys, who believed that the new fence would put them out of work. Warehouses in Texas were filled with carloads of unsold barbed wire.

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Ellwood was undaunted. The remarkable selling ability of his young nephew, John Gates, had attracted his attention. Uncle Isaac persuaded John to undertake to sell barbed wire to Texans. His salary was $30 per month.

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When Gates reached San Antonio he looked gloomily at the spools of barbed wire piled high in a warehouse. Ranchmen were even unwilling to be given a free demonstration of the wire's effectiveness, especially since it would then cost $1,000 a mile to string the fence.

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Finally, Gates hit upon the idea of publicly proving the value of his product by staging a rodeo in the Military Plaza of San Antonio. He advertised that the cattle present would be the "toughest and wildest in all Texas."

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When the herd was driven into the barbed wire arena by a wild-yelling cowhand, the cattle broke in all directions, charging at the fence. But the eight strong strands of wire held firm and the steers, after one experience, stayed away from the steel barbs.

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Ranchmen needed no more persuasion. Gates was unable to supply all the orders that poured in. The rodeo started a revolution in the cattle industry and in the barbed wire business. Barbed wire was soon shipped into Texas, not by the carload, but by the trainload.

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As soon as cattlemen were "sold" on barbed wire, they hastened to fence, not only their own property, but large areas of the public domain, in an effort to keep off the sturdy pioneer looking for land. The struggle between the cattlemen and homesteaders was bitter and sometimes bloody. Accusing the cattlemen of setting up "barbed wire kingdoms," the farmers appealed to the Government, and laws were passed to force the "cattle barons" to surrender public lands which had been either given to homesteaders or sold to them at a low price.

Washburn & Moen Enter The Picture

In the meantime, the attention of Washburn & Moen Mfg. Co., back East, was attracted by the appearance in the market of the then novel barb wire product. As

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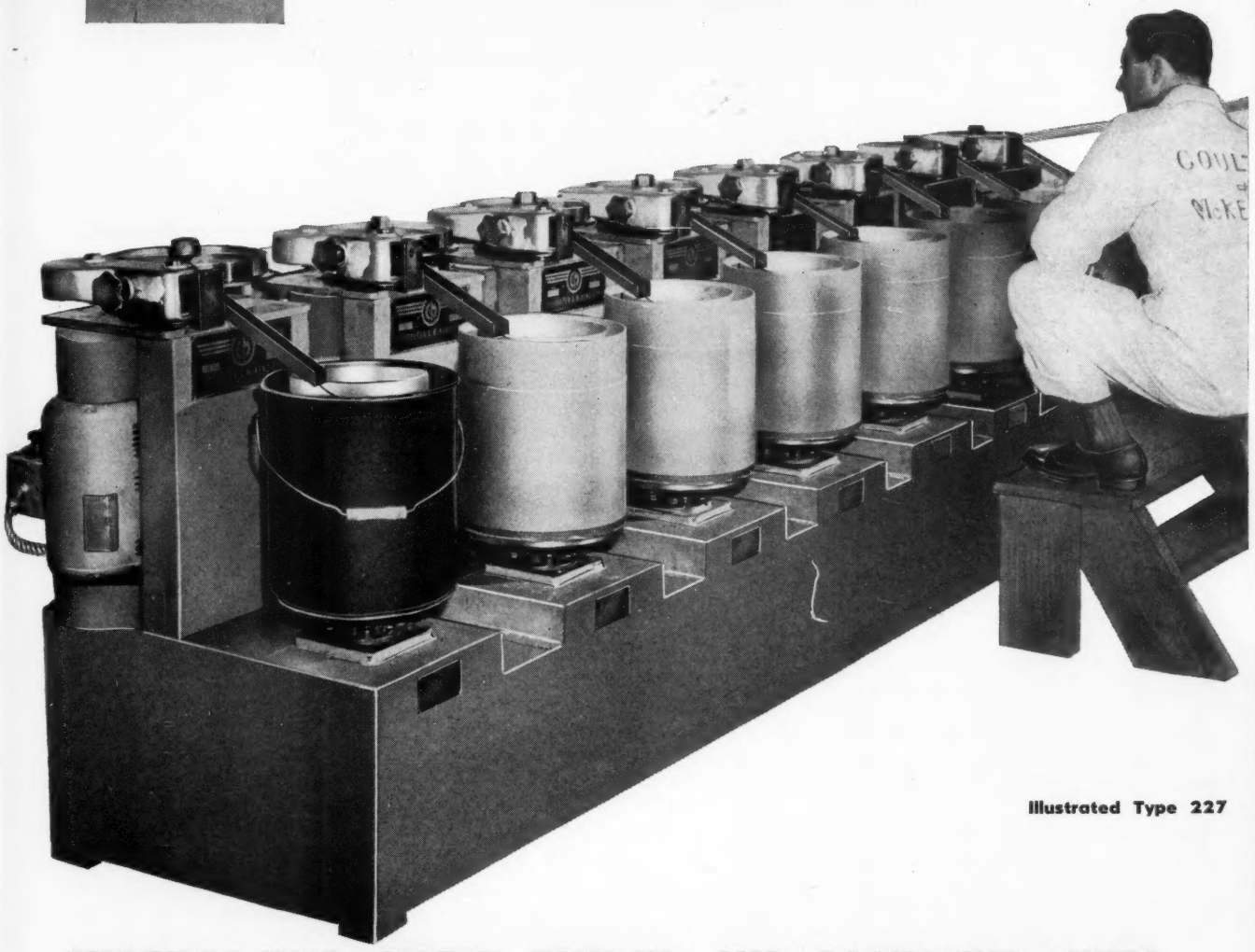
DRAW • PAK TAKE-UP UNITS



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227	100	11″ x 12½″ Fibre or Steel	50 to 150
327	40	8″ x 9½″ Fibre or Steel	10 to 40

Patent No. 2,732,060—other U. S. and foreign patents pending.

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IPCEA Activities

by S. J. Rosch
President, Insulated Power Cable Engineers Association
Consulting Cable Engineer
Anaconda Wire & Cable Company
Hastings-on-Hudson, New York

This talk was presented at the Wire and Cable Section Meeting of NEMA on April 18th, 1956, at Rye, N. Y. and is published through the courtesy of the National Electrical Manufacturers Association and the author.

When I first entered the Wire and Cable Industry, life was a comparatively simple matter, particularly for our chosen field. It is true that we had transmission and distribution of electrical energy, we had the problem of branch circuits, we had a National Electrical Code and an Underwriters' Laboratory. We had a U.S. Navy and an Army but very few problems of consequence as far as wire and cable were concerned. The amounts of energy generated and consumed were an infinitesimal fraction of what they are today and the voltages for which insulated conductors had to be designed were comparatively low. Only 10 years prior to that time, the AIEE Transactions contained a paper describing the first 25,000 volt paper cable, the largest in the world at that time, made by the National Conduit & Cable Co. Direct current was used very extensively and even where a-c was transmitted from one area to another, it very often emerged as d-c after passing through the usual rotary converters. Most of the drives in factories were through belt-driven pulleys, the main power drive being in the form of very large engines with a fly-wheel mounted at the end of the shaft.

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We had very few automobiles, trolleys were horse - drawn, no radio, no TV, the coherer had just been developed to enable long-distance wireless transmission, aluminum was practically unknown, the only rubber thought worthy of usage was natural rubber of the Up-River Para grade, because plantation rubber was still something of experimental nature, we knew nothing about low power factor or dielectric loss nor was there any need felt for making insulations better, other than to see that they had high megohms. As a matter of fact, the index of high quality for an extruded rubber insulation at that time, was high tensile and high megohms. We had no PVC, polyethylene, Butyl, Neoprene, Teflon, Fluorothenes, GR-S, Buna N, Silicones, Type ACV, USE, UF, RU, RHW and the numerous other types of wiring materials available today. A magnet wire that could operate with a fair degree of success at temperatures up to 90°C, was considered excellent.

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Our stock in trade at the end of 1910 was a moderate line of rosin oil impregnated paper cables covered with a commercially pure lead sheath, low voltage VC cables covered with lead or braid, low voltage rubber insulated wires and cables covered with the same lead sheath or braid, supplemented with triple braid weatherproof, slow-burning or slow-burning weatherproof wires and cables. Practically all distribution was in the form of open lines outdoors with very little through direct burial. Load concentrations were very small because the use of electrical energy had hardly begun. Even as late as the '20s, AIEE Std. #30 dealing with insulated wires and cables, recommended the use of #14 for voltages up to 11 Kv, something to shudder at in the light of today's knowledge. During that same period, the problems of corona and ozone resistance were comparatively unknown for rubber-insulated conductors.

Life for the Wire and Cable Industry was comparatively simple then and remained that way until 1923 when the virtues of type H cable began to be realized; 1924 when the AEIC specification calling for ionization guarantees on paper cable made its appearance; 1925 when the oil-filled cable opened up an entirely new vista as to the possibilities of transmission of high voltages with insulated cables; 1928 when the use of accelerators and antioxidants in rubber insulations caused a metamorphosis in rubber technology leading to the use of the Geer Oven and Oxygen Bomb as criteria of insulation durability; 1929 when the idea of super-vacuum in the commercial manufacture of paper cables became a reality; 1931 when new concepts for ozone-resistance and improved secondary-network cables were born; 1932 when the first modest shipments of Neoprene were made available to those hardy pioneers who were willing to pay $1.15 a pound; and 1938 when the NEMA Committee's presentation of an AIEE paper on current-carrying capacity of rubber - insulated wires and cables opened up recognition by the Code of temperature classifications for various types of insulations and different current ratings for each classification.

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With the advent of each of these epochs, it became evident that no single manufacturer could solve all of these problems. IPCEA was born some 30 years ago with the idea of collectively tackling the engineering problems of paper insulation because that was the sole dielectric considered capable of handling bulk power at moderate and high voltages. Subsequently,

it was broadened to take into consideration VC and rubber insulations as well. The wisdom of IPCEA's handling of such matters soon became apparent when jointly with AEIC they brought a common-sense approach to the technical requirements for paper cable, and with the cooperation of other consumers' engineering associations, developed what ultimately became the universally-used VC specifications and the so-called omnibus specifications for a wide variety of rubber-insulated wires and cables.

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Shortages provoked by World War II however, brought a rash of new problems into focus. Wires and cables were used for purposes and under installation conditions never contemplated for certain constructions and materials. Cables intended for indoor operation were installed outdoors or buried directly in the ground. Unanticipated loads caused exceptionally high-operating temperatures. Wires and cables which had originally been over-insulated for an extra margin of safety under normal operation, were subjected to higher voltage operation. Cable finishes which had worked well under normal conditions, suddenly began to disintegrate due to the influence of environmental surroundings. The presence of new chemicals created during the war, or their vapors, began to ruin otherwise and hitherto-considered excellent insulating materials. Fault currents in industrial plants, began to assume proportions hitherto considered possible only with utility operations. Wires and cables were called upon to carry loads never contemplated by cable engineers. Hurried examinations of text books and handbooks failed to throw light on these problems, particularly as regards ac/dc resistance ratios of large copper conductors whether of concentric, annular or segmental construction. If that were true of copper, how much truer was it of aluminum conductors?

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World War II and its aftermath, the great pent-up demand of industry for ever-increasing quantities of newer, better and bigger cables for an ever-growing list of new uses hitherto undreamt of, brought home very forcibly the awareness that the wire and cable manufacturer had to become more intimately acquainted with installation problems and just what happens to an insulated conductor when operating under a wide variety of installation and invironmental conditions. Whereas wires and cables were considered expendable during the War, the converse was true immediately after. This necessitated more laboratories, greater expenditures for research, the use of more physicists, engineers, metallurgists and new research tools, in order to even begin to try to keep up with the speed necessitated by these unprecedented demands for wires and cables. The War put thermoplastics, Neoprene, Butyl and GR-S some 10 years ahead of normal development. Following in the wake of all of these developments was IPCEA, which studied all of these new materials until a specification for each was developed and made available to industry.

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It was not long before the members of IPCEA became aware of their shortcomings in trying to solve their problems by themselves and in their own research departments. They therefore began to take more intensive interest in meetings with electrical contractors, electrical inspectors, the AEIC, the EEI, ASTM, ARA, Federal Specifications Board, Underwriters' Laboratories, U.S. Navy, the Signal Corps and many other divisions of our Armed Forces. Discussions with these groups plus trips to unusual installations coupled with simulated installations in the respective research laboratories, not only led to improvements in old designs but in revisions of IPCEA standards reflecting this new and more intimate knowledge. Excursions into the field soon brought home that the industries of the future would not only use a host of new materials but would also use electrical energy in quantities never dreamt of. In 1952, the total electric-utility industry sales was some 342 billion KWHR, but one chemical plant in Texas alone, used over 4 billion KWHR that same year, or more than 1% of the total in the U.S.A. This was more than required to run a city of over a million population in 1952. Remember, this was only one plant and with the tremendous growth of the chemical industry in the U.S.A., this was only an indication of things to come and not a pipe dream created by some statisticians.

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In 1938 the average annual residential customer consumed some 853 KWHR. In 1955 this figure was 2750 but in the State of Washington, it was over 10,000. In the City of Toronto, it was over 5,000. Yes, the use of electrical energy does double every decade and that means that by 1966 we will use about twice the conductor metal that was used in the preceding 75 years. This is an astounding figure and I am sure that everyone knows that power is still equal to voltage times current and that if we do not have all the metal to take care of these needs, we will have to make up the difference with insulation and temperature. This points up to the need of a closer and more balanced study of the properties of materials, new, modified and old, and how they can best be incorporated in our wire and cable designs. What better medium can accomplish this than the team of NEMA and IPCEA? With NEMA supplying the direction as to our endeavors, I know that IPCEA's service to industry is bound to be of still greater importance in the future.

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IPCEA and its specifications are known and respected throughout the world. I know this from first-hand discussions with foreign cable engineers both on their home grounds as well as during their visits to our country. No organization can rest on its laurels nor can any segment of our industry stay put for any length of time. IPCEA until now, has devoted itself to a study of the problems dealing with engineering and design and culminating in specifications for pa-

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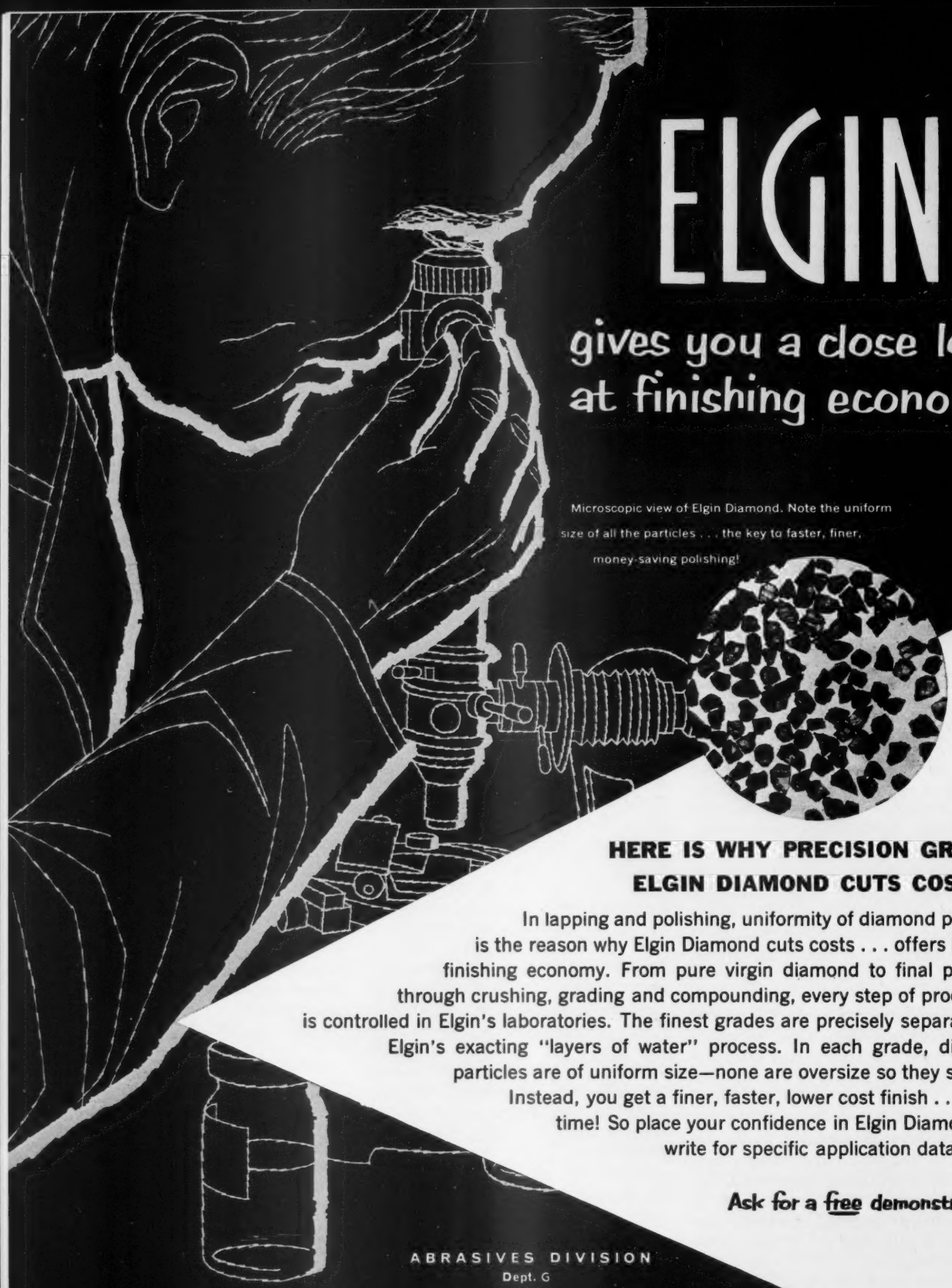

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The Manufacture of Standard Nuts

By A. J. Gibbs Smith
Solihull, England

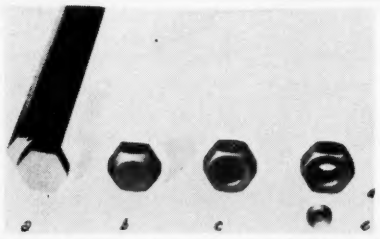

Fig. 1—Sequence of operations in Hatebur cold-forming process.

The publicity which of late years has been given to novel and ingenious fastenings such as pronged speed nuts, clip, push-on, and snap nuts, developed largely to meet the requirements of the aircraft and sheet-metal industries, has tended somewhat to obscure the fact that the manufacture of standard hex nuts is still a large, prosperous, and steadily-growing industry having a heavy demand which it has some difficulty in meeting.

★ ★ ★

For the manufacture of standard, lock, washer-faced, and similar nuts a number of advantages are claimed for the cold-forming process from round or hex bar as compared with the older method of production from flat bar. One of the chief of these advantages is the considerable reduction in the amount of waste and consequently in the weight of raw material required to produce a given quantity of nuts. For instance, using flat bar (Fig. 2) of a given quantity of material (100%) 54.4% would go into the nut and 45.6% into waste, whereas with the cold-forming process it becomes possible to utilize as much as 88-93% of the weight of the raw material in the nut, reducing the waste merely to 7-12%. Fig. 1. shows the sequence of operations in the cold-forming process developed by the Swiss firm of F. B. Hatebur, of Basel. In this, the material used is hex bar (or round bar first drawn through a hexagonal die), and the nut which is completely finished apart from tapping is produced on two machines, the first being a pre-forming and the second a finishing press. On the former, the required volume of material is cut off (a), and on the second station squared off into a hexagonal blank with one chamfer formed (b), while on the next automatically-fed finishing press (which also has two stations) the blank is first formed to shape with a second chamfer and a hole pre-formed at the same time from both sides (c), followed at the next station by the waste slug (e) being punched out and the piece ejected (d).

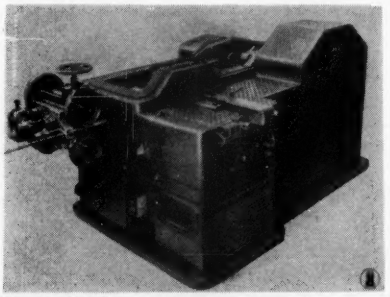

Fig. 4—Hatebur pre-forming press.

This article describes and illustrates some Swiss developments in the cold forming of nuts.

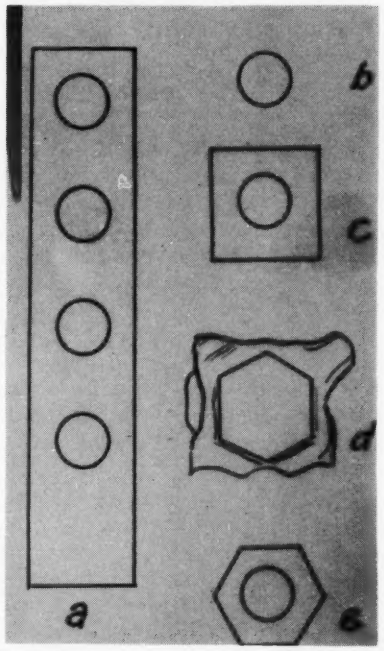

Fig. 2—Sequence of operations with flat bar (a—flat bar punched; b—slug, waste; c—sheared-off blank; d—die trim, waste; e—nut blank.

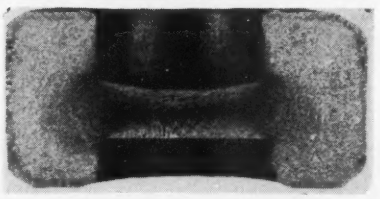

Fig. 3—Grain structure of cold-formed nut.

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Between the first and second machines and dividing the cycle of operations at the point between b and c, an annealing operation is generally interposed, and at this stage the blanks can also be barrelled or phosphate-coated. This intermediate annealing operation gives the nut maker a much wider field of choice for the steel, and permits the economical and successful employment of many qualities which in general would not be considered suitable for cold-forming operations on account of the greatly decreased tool life which their use would normally entail. The process therefore is especially interesting for the manufacture of high-tensile and similar special nuts, and it is claimed to produce nuts equivalent in appearance to those machined from the bar on an automatic, but superior in quality, and at a much lower cost. Fig. 3. is an etched section

(*Please turn to page* 1046)

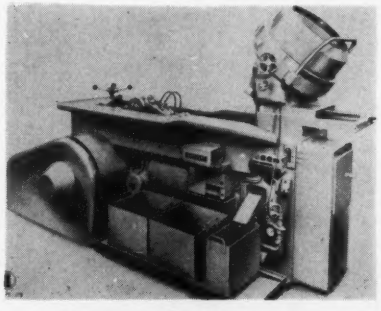

Fig. 5—Hatebur finishing press.

Automatic Forming of Wire Products

By Edmund D. Sickels
Editor
WIRE AND WIRE PRODUCTS
Stamford, Conn.

Wire product forming is big business in the aggregate. Since the principal tool of the industry is the popular four slide machine, it was felt that a description of the operation of these machines would be of interest to our readers.

Introduction

"Wire form" is a term applied to any of a large variety of products made on hand or power operated machines especially designed for the purpose.

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There are a couple of thousand concerns, large and small, who engage in making such things as hooks, rings and shaped parts that will wind up as components of other products, such as bird cages, lamp shades, fan guards, and so forth.

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Then there are specialists who produce items like pins, zippers, springs, nails, bolts, tools, etc., the manufacturers of which are not ordinarily thought of as fabricators of wire forms, since the production is usually confined to one general category of products. They would be classed in the pin, spring, fastener or other industries, even though they are in fact making wire products.

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Where volume of production is a factor, wire forms are quite generally made on the versatile "four-slide" machines, which can be tooled to produce an almost infinite variety of shapes and forms on just one piece of equipment. Such machines are always power-operated and are capable of continuous, automatic high-speed production. A few of the many products that can be made on four-slides are illustrated in Figure 1.

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While many products are formed from round wire, others may be made from flat, ribbon, square or other shaped wires. Wire for such operations is usually purchased by the manufacturer direct from a wire mill. The forming concern buys its wire in coils and feeds the stock from a pay-off reel right into the forming machine without prior processing.

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The advantage of the four-slide machine, or other special-purpose equipment, is that it makes possible the forming of wire into the desired forms at low unit costs. This is the result of high speed, automatic operation and the fact, comparatively speaking, that forming equipment does not necessitate a large outlay of capital. There are literally thousands of different tooling arrangements that may be provided for the varied end products that any manufacturer may want to produce and, almost invariably, the wire stock used is widely procurable and low in cost.

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Many wire product producers have made it a point to develop business by studying products made from metal stampings, wood or other materials, and coming up with re-designed items constructed wholly or principally from wire that have greater strength, lighter weight, lower cost and, very often, better utility.

Production Methods

Where products are made on a four-slide machine, a typical example of which is shown in Figure

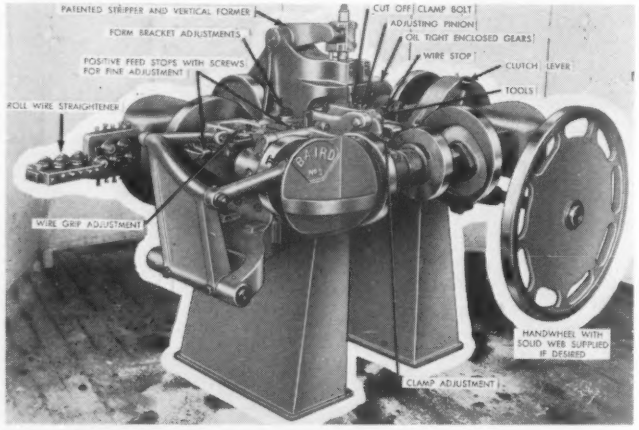

Fig. 1—Photograph of typical four slide machine. * * * * * * *

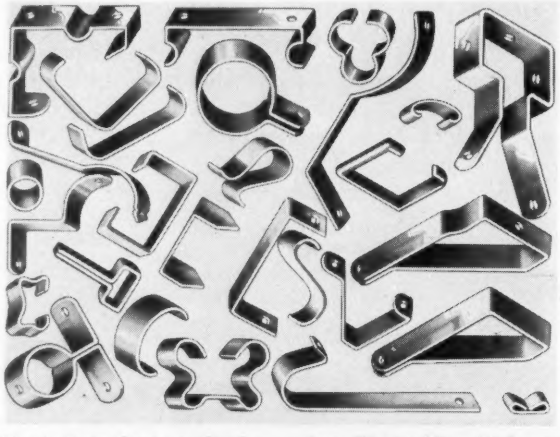

Fig. 2—Some shapes produced on a four slide machine. Stock may be round or flat. * * * * * * * * * * * * *

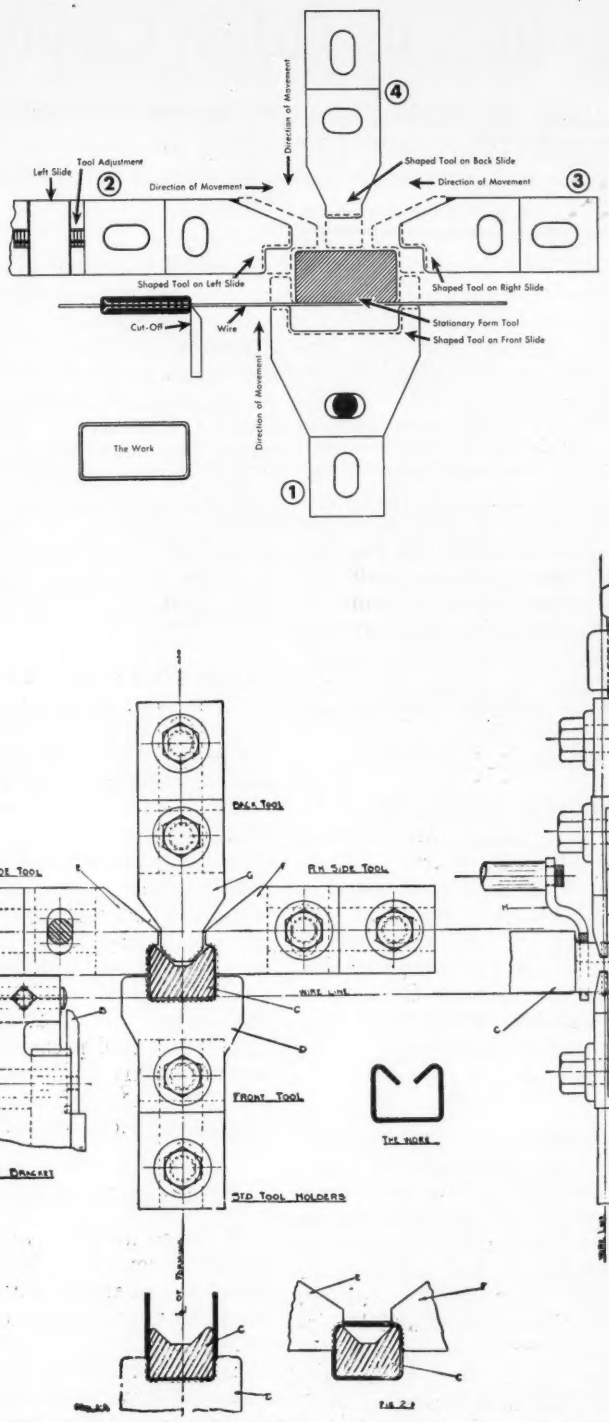

Fig. 3—Plan drawing of four slide machine showing sequence of operations for two simple forms.

2, several operations of straightening, feeding and cutting off to length, plus forming operations, are all combined into one automatic piece of equipment which does the several operations in one handling. The positive feed mechanism automatically grips the wire or ribbon metal and draws it through the straightening rolls, feeding an accurate length of material, after which the material is cut off and formed to the required shape by the rapid successive motions of the four forming slides, after which they receded and the part is ejected from the form about which the part has been shaped.

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In conversation with a special wire forming machine manufacturer not too long ago, in looking over a rather complicated machine, the writer marveled at the ability of anyone to conceive and make such intricate equipment. His response was disarmingly simple—even though one could realize the ingenuity required to coordinate the completed mechanism. He said that all the designer had to do was to take one step at a time. For this step a single forming tool was devised. To this would be added the succeeding steps—as many as required.

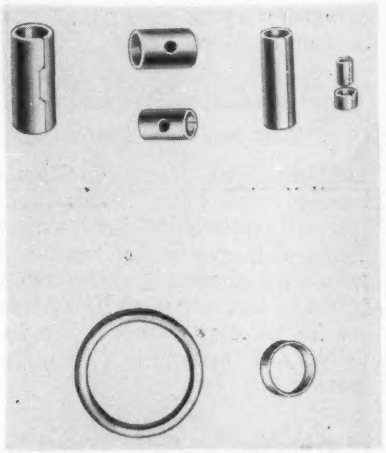

Fig. 4—Other examples of products made on four slide machines with suitable tooling.

Some forming machines may have as many as nine slides, although for the great majority of forming operations it has been found that the standard four-slide machine is adequate. The ingenuity in the design of these versatile machines lies in the integration of the successive steps into a compact unit that automatically will shape the end product into something that can be sold to consumers.

How the Four-Slide Works

Previous to setting the machine in operation, it is, of course, necessary to mount the various forming tools and form required by the shape of the part to be produced. Adjustments to the roll straightener and feed mechanism

(*Please turn to page* 1044)

Notes on Wire Activities In Other Countries

These notes were translated from recent issues of Draht-Welt by Jerome W. Hone, Worcester, Mass., and are published with the kind permission of that publication.

The Argentine Wire Industry

The Argentine metal industries have been united in a single association since 1953, and this is divided into separate technical sections, the section for wire and wire products having 53 members, while 25 enterprises constitute the section for nails, screws, bolts and rivets. With few exceptions almost all enterprises belong to the association, so that these numbers give approximately the correct present status of these two groups in Argentina. The majority are small firms employing only small numbers of workers.

Russian Barbed Wire Going to the Near East

About 700 tons of Russian barbed wire have been shipped through Odessa to Lebanon and Syria. This was galvanized 2-point wire with about 2½ inch barb interval of the American IOWA type. As far as known, this is the first delivery of the kind to a Near East market.

Markets for Specialty Wire Lively

The export business in various specialty wires has been distinguished by a lively demand. New markets are opening, but the number of (German) supplying firms is limited. In this category come triangular and square wires, in which Canada, Australia, South Africa, Brazil and India are showing interest. Half-round wire, that England, the U.S.A., Sweden and Australia are seeking, flat wire, purchased likewise by New Zealand and Argentina are selling. Stitching wire is going to India, Red China, Peru, Chile and Mexico. Welding wire almost everywhere is in greater demand. Only in the case of oval high tensile steel wire is the demand unsatisfactory.

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Black annealed baling wire, mostly No. 6 to No. 16, and in coils of 56, 100 and 112 lbs. are in good demand from South Africa, New Zealand, Brazil, Uruguay, Paraguay and Argentina although in the latter markets the matter of payments, because of foreign exchange quotas, presents difficulties. The stocks of baling wire are almost exhausted and almost none is being produced in these countries. Only in Australia does the production nearly meet the demand. For so-called boot and shoe wire in No. 6 to No. 20 the demand is likewise favorable, but here the Scandinavian, Portuguese and North American markets are by far the most active. In Canada and the U.S. the prices are high; in the other markets somewhat depressed.

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Biscuit wire, bright, No. 7 to No. 10, for biscuit carton packaging is especially scarce in England, and as there is no source for iron, the continent customers buy it from the U.S. at high prices. This is annealed Crescent wire for crating in 10 x 10 SWG sizes in small bundles. Canada and Asia are also buying this wire.

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The Australian wire industry latterly has been able to take orders. Business in rivet and screw wire from ½ in. to SWG 14, on the other hand, has slackened to a marked degree, but this appears to be only a temporary condition. Only Red China, India and Pakistan buy in some measure; recently Japan has been offering the material at favorable prices. 4 or 7 Strand wire, electrogalvanized (SWG 8), is in small demand, excepting from all Central American and East African markets. The Belgian Congo has begun to buy to some extent. Simple wire rope as 3 x 14, 5 x 14, 5 x 16, 7 x 10, 14 or 16, galvanized or otherwise worked, is in low demand, while normal wire rope of high quality, with hemp or other core, is selling well in the export market. Prices have risen 10% over those of last year.

English Copper Wire to Russia and China

Russia has been buying large quantities of copper wire and cable of all kinds in England. In recent months Russia has become England's best customer for these materials. It is supposed that a considerable part of these purchases will find their way to China, which is banned against such trade by the United Nations Organization, although permitted to Russia.

Used Wire Products Machines Find No Market

Used wire products machines are now in weak demand in the world market, whereas last year's sales reached a notable high. All countries today are demanding only the most modern machines and apparatus and are willing to pay more and wait longer for it. The American dealers have large stocks of used wire products machines and sell very little of it for export. Rapid wire nail presses are an exception to this, as these find Indian and other Asiatic markets, provided the prices are favorable.

Three-Cornered Marketing

Three-cornered business in wire is not uncommon. Much of this arises out of special circumstances. Numerous countries, poor in capital, suffer from unfavorable balance of trade, which leads to limitation of imports, so that they can find no sale for their own products in countries from which they would like to buy industrial products. For example, the Turks are much in debt to Germany, Benelux, England, Italy, etc. Not however to Spain. Spain now delivers to Turkey, among other things, wire, cable, wire rope, etc., although these are not its own products, but

(*Please turn to page* 1041)

THE ANNUAL CONVENTION OF THE WIRE ASSOCIATION

PENN-SHERATON HOTEL, PITTSBURGH, PA., MONDAY THROUGH THURSDAY, OCTOBER 29 - NOVEMBER 1, 1956

The Wire Association's Headquarters at The Penn-Sheraton Hotel
Will be open each evening from Sunday, October 28th, except Wednesday night.
YOU ARE CORDIALLY INVITED TO CALL AND MEET OTHER WIRE INDUSTRY MEN

THERE WILL BE A REGISTRATION FEE OF $11.00 FOR MEMBERS AND $13.00 FOR NON-MEMBERS, INCLUDING AN ANNUAL LUNCHEON TICKET, FOR ALL THOSE ATTENDING THE TECHNICAL SESSIONS AND MEETINGS. PLEASE HAVE YOUR ASSOCIATION MEMBERSHIP CARD WITH YOU AND SHOW IT WHEN REGISTERING.

ADMISSION WILL BE BY BADGE ONLY—PLEASE WEAR IT.

THE WIRE ASSOCIATION PROGRAM COMMITTEE FOR THE 1956 CONVENTION

GENERAL PROGRAM CHAIRMAN
Charles H. Williams, Jr.
Superintendent, Rod and Wire Mills
Pittsburgh Steel Company
Monessen, Pa.

GENERAL ACTIVITIES

EXECUTIVE SECRETARY

Richard E. Brown
The Wire Association
Stamford, Conn.

REGISTRATION

R. S. Spengel, Asst. Exec. Secy.
The Wire Association
Stamford, Conn.

ENTERTAINMENT

Eber J. Hubbard, President
Hubbard Spool Company
Garrett, Ind.

All papers presented at the Convention by members of The Wire Association are eligible for consideration for the Annual Medal Award, and will be voted upon by the Board of Directors at the next Spring meeting of that body.

FERROUS DIVISION

CHAIRMAN

William Mohr, Wire Mill Supt.
The Colorado Fuel & Iron Corp.
South San Francisco, Cal.

COMMITTEE MEMBERS

Sterling Edwards, President
E. H. Edwards Co.
So. San Francisco, Cal.

Frederick H. Parkin
Parkin Chemical Co.
Pittsburgh, Pa.

H. W. Waters, West Mill Supt.
Canada Works, Steel Company of Canada
Hamilton, Ont., Canada

Fred Webber, Chief Metallurgist
Wickwire Spencer Steel Div.
The Colorado Fuel & Iron Corp.
Buffalo, N. Y.

Technical papers are preprinted in the October issue of Wire and Wire Products insofar as possible. Titles to papers accepted will be given to The Wire Association and duly copyrighted at the time of publication.

NON-FERROUS DIVISION

CHAIRMAN

Hugo W. Biskeborn, Chief. Engineer
The Ansonia Wire & Cable Co.
Ashton, R. I.

COMMITTEE MEMBERS

Raymond H. Dudley, Chief Chem.
Whitney Blake Company
New Haven, Conn.

Lester D. Fitler, Plant Eng.
Rome Cable Corporation
Rome, N. Y.

Urbain J. H. Malo, Tech. Dir.
The Crescent Company
Pawtucket, R. I.

All wire mill men and wire mill suppliers are invited to attend this convention, see how the Association functions and participate in the activities. Simultaneous technical sessions for Ferrous and Non-Ferrous Divisions are held.

REGISTRATION AND ALL MEETING ROOMS ARE ON THE 17th FLOOR. Please be prompt in your arrival for the technical sessions. Those with rooms for entertainment are requested NOT TO KEEP THEM OPEN during the technical sessions.

MONDAY, OCTOBER 29th

9:00 A.M.
REGISTRATION

10:00 A.M.
DIRECTOR'S MEETING

12:30 P.M.
PROGRAM COMMITTEE LUNCHEON

THE CONVENTION PROGRAM

PENN-SHERATON HOTEL, PITTSBURGH, PA., OCTOBER 29 - NOVEMBER 1, 1956

MONDAY MORNING—

9:00 A.M. Registration Desk opens on the 17th floor.
10:00 A.M. Annual Meeting of the Board of Directors of the Wire Association.
12:30 P.M. Directors' Luncheon for Program Participants. Address of Welcome by Leslie C. Whitney, President, The Wire Association.

MONDAY AFTERNOON—2:00 P.M. JOINT TECHNICAL SESSION—FERROUS AND NON-FERROUS DIVISIONS

CHAIRMAN OF MEETING

Frederick H. Parkin, Parkin Chemical Company, Pittsburgh, Pa.

PAPER: "Draw-Pak"	by Joseph J. Kovaleski, Sales and Application Mgr. Coulter and McKenzie Machine Co., Bridgeport, Conn.
PAPER: "Aluminum Coating of Steel Wire"	by Paul Ziegler, Dir. of Met. Res. Kaiser Aluminum & Chemical Corp., Oakland, Calif.
PAPER: "The Use of Wire for Thermocouples and Accessories"	by Marvin R. Danielson, Mgr., Research Dept. Claud S. Gordon Co., Richmond, Ind.

FERROUS DIVISION TECHNICAL SESSIONS

TUESDAY MORNING—9:30 A.M.

CHAIRMAN OF MEETING

H. W. Waters, West Mill Supt., Steel Company of Canada Ltd. Canada Works, Hamilton, Ont., Canada

PAPER: "Automotive Zigzag Spring Wire"	by W. J. Van Horn, Met. Rod & Wire Div. Detroit Steel Corp., Portsmouth, Ohio
PAPER: "Industrial Diamonds in the Wire Mill"	by Leonard A. Zucker, President Union Wire Die Corp., New York, N. Y.
PAPER: "The Steel Wire Industry in Australia"	by J. K. MacDougall, Rylands Bros. (Aust.) Ply. Ltd. The Wire Mill Div. of Broken Hill Proprietary Co. Ltd. John A. Macpherson, U.S.A. Representative, will deliver the paper.

TUESDAY AFTERNOON—2:00 P.M.

CHAIRMAN OF MEETING

Sterling Edwards, Pres., E. H. Edwards Co., So. San Francisco, Cal.

PAPER: "Heat Treating of High Carbon Steel"	by N. D. Montgomery Pittsburgh Steel Co., Monessen, Pa.
PAPER: "Oil Tempered Wire"	by George Sweitzer Jones & Laughlin Steel Corp., Aliquippa, Pa.
PAPER: "Steel Wire: Some Recent Developments in Europe"	by Reginald S. Brown, Technical Dir. Rylands Brothers Ltd., Warrington, England

WEDNESDAY MORNING—9:30 A.M.

CHAIRMAN OF MEETING

Fred Webber, Chief Metallurgist, Wickwire Spencer Steel Div. Colorado Fuel & Iron Corp., Buffalo, N. Y.

PAPER: "Introducing the Nailmaker"	by Richard J. Fisher National Machinery Co., Tiffin, Ohio
PAPER: "Automatic Coil Strapping"	by J. F. Beckman, Asst. Dir. of Sales Signode Steel Strapping Co., Chicago, Ill.
PAPER: "Spiral Wrapping"	by Harold A. Myers, President Rinkle-Krinkle Paper Co., Boston, Mass.

THE CONVENTION PROGRAM

PENN-SHERATON HOTEL, PITTSBURGH, PA., OCTOBER 29 - NOVEMBER 1, 1956

NON-FERROUS DIVISION TECHNICAL SESSIONS

CHAIRMAN OF MEETING
Lester D. Fitler, Plant Engineer, Rome Cable Corp., Rome, N. Y.

TUESDAY MORNING—9:30 A.M.

PAPER: "Properzi Continuous Casting Process" — by Frank R. Nichols, President, Nichols Wire & Aluminum Co., Davenport, Iowa

PAPER: "Certain Aspects of the Operation and Maintenance of Properzi Continuous Casting and Rolling Mill." — by V. G. G. Nayar, General Manager and K. R. K. Nair, Works Supt., The Aluminum Industries Ltd., Kundara, South India

PAPER: "Zirconium" — by M. F. Judkins, Mgr. New Products Div., Firth Sterling, Inc., Pittsburgh, Pa.

PAPER: "The Effect of Salts in Formvar on the Dielectric Properties of Formvar Alkyl-Phenolic Coated Magnet Wire" — by Robert E. Kass and Edward Lavin, Research Dept., Shawinigan Resins Corp., Springfield, Massachusetts

CHAIRMAN OF MEETING
Urbain J. H. Malo, Technical Director, The Crescent Co., Pawtucket, R. I.

TUESDAY AFTERNOON—2:00 P.M.

PAPER: "The Control of Insulated Wire Diameter" — by Charles M. Fredrickson, Asst. Plant Supt., Kaiser Aluminum & Chemical Corp., Newark, Ohio and Charles D. Gibbs, Sales Manager, Industrial Gauges Corp., Englewood, N. J.

PAPER: "Polyethylene Insulated High Voltage Power Cable" — by Victor Siegfried, Power Cable Engineer, The Ansonia Wire & Cable Co., Ashton, R. I. and Dr. R. V. Jones, Mgr. of Tech. Services & Development, Phillips Chemical Co., Bartlesville, Okla.

PAPER: "Silicone Insulated Conductors" — by Clayton Dormire, Manager, Electrical Section, Dow-Corning Corp., Midland, Mich.

PAPER: "Measurement of Electrical Conductor Characteristics" — by L. F. Roehmann, Senior Research Electrical Engineer, Kaiser Aluminum & Chemical Corporation, Department of Metallurgical Research, Spokane, Washington

CHAIRMAN OF MEETING
Raymond H. Dudley, Chief Chemist, Whitney Blake Co., New Haven, Conn.

WEDNESDAY MORNING—9:30 A.M.

PAPER: "Copper and Copper Alloy Wire for Mechanical Purposes" — by T. E. Velfort, Manager, Copper & Brass Research Assoc., New York, N. Y.

PAPER: "Drawing Quality Aluminum Wire" — by O. L. Burtenshaw, Senior Metallurgist and R. E. Hutchinson, Wire Drawing Supt., Kaiser Aluminum & Chemical Co., Newark, Ohio

PAPER: "Plasticizers for Wire Insulation" — by William C. Goodwine, Sales Manager, Plasticizers, Tennessee Products & Chemicals Corp., New York, N. Y.

PAPER: "Continuous Production Electroplating of Tin on Copper Wire using Alkaline Potassium Stannate Bath" — by M. K. Schurter, Development Engineer, Federal Wire and Cable Company, Limited, Guelph, Ontario, Canada and R. T. Gore, Market Development Engineer, Metal and Thermit Corporation, Rahway, New Jersey

WEDNESDAY PROGRAM (Cont'd.)

AT 1:00 P.M.—THE ANNUAL WIRE ASSOCIATION LUNCHEON
(Ballroom, 17th Floor)

LADIES ARE WELCOME LADIES ARE WELCOME

THE PRESENTATION OF AWARDS FOR 1955 PAPERS

MEDAL AWARD: To Allan B. Dove, Research Supervisor, Wire & Wire Products Div., The Steel Company of Canada Ltd., Hamilton, Ont., Can., for his paper: "The Influence of Nail Design and Manufacturing Practice on Joint Strength."

CERTIFICATE OF HONORABLE MENTION (FERROUS DIV.) to Dr. Fritz Schwier, Chief Engineer, Wire Dept., Felten and Guilleaume Carlswerk, Germany, for his paper: "Stress Corrosion and Relaxation of High Carbon Steel Wire for Prestressed Concrete."

CERTIFICATE OF HONORABLE MENTION (NON-FERROUS DIV.) to Robert O. Abbott, Jr., Asst. General Foreman, Bristol Brass Corp., Bristol, Conn., for his paper: "Some Bending Characteristics of Cartridge Brass, 70%, and Yellow Brass, 65%, Wire."

PRESENTATION OF TWENTY-FIVE YEAR CERTIFICATES by Leonard C. Crewe, Jr., Chairman, Board of Past Presidents.

THE MORDICA MEMORIAL LECTURE: "Fulfillment of a Trust," by Kenneth H. Davis, President, The R. H. Davis Wire and Cable Corp., Los Angeles, Calif. This lecture was completed prior to the sudden death of the author on July 10, 1956. The lecture will be delivered by a member of the K. H. Davis Wire & Cable Company organization.

AT 4:00 P.M.—THE ANNUAL MEETING OF THE WIRE ASSOCIATION
This is the annual business meeting of members of the Association. Your personal attendance is needed and urged to discuss proposals and transact business.

Chairman of Meeting
Leslie C. Whitney, President
The Wire Association

IN THE EVENING BALLROOM, 19TH FLOOR

THE ANNUAL STAG SMOKER—DINNER

6:30 P.M.—Cocktail Bar Opens

7:30 P.M.—Dinner and Show

CHAIRMAN, ENTERTAINMENT COMMITTEE: Eber J. Hubbard, Jr.

COME ONE, COME ALL—ENJOY FELLOWSHIP AND A GOOD SHOW!

THURSDAY MORNING—

PLANT INSPECTION TRIPS

FERROUS DIVISION TOUR—Busses will leave the hotel for the 25 mile trip to Monessen, Pa., to visit the Rod and Wire mills of the Pittsburgh Steel Company. The company will provide luncheon for their guests at the conclusion of the tour of their mills, returning all persons to the hotel in the early afternoon.

NON-FERROUS DIVISION TOUR—Busses will leave the hotel for Glassport, Pa., to visit the plant of the Copperweld Steel Corporation there. Distance, about 18 miles. Arrangements for luncheon will be provided. Visitors will be returned to the hotel directly after lunch.

ALL MEN IN ATTENDANCE ARE INVITED TO GO ON ONE OR THE OTHER OF THESE TOURS. BE SURE TO BUY YOUR BUS TICKET IN ADVANCE.

FOR THESE TOURS, ALL PERSONS MUST GO BY BUS. NO PRIVATE CARS MAY BE USED. TO BE ADMITTED, EACH VISITOR MUST WEAR HIS BADGE; NO EXCEPTIONS PLEASE. THESE MEASURES ARE FOR SECURITY, SAFETY AND THE IDENTIFICATION OF VISITORS.

These plant inspection trips conclude the 1956 Convention.

RESEARCH PAPERS ARE PREPRINTED IN THE OCTOBER ISSUE OF WIRE AND WIRE PRODUCTS.

A summary of the discussions and the Mordica Memorial Lecture will appear in the January issue of Wire and Wire Products.

Papers not received in time for preprinting will be published in the November and December issues of Wire and Wire Products.

Report On NEMA's Meeting of the Wire and Cable Section

This summary of the discussions presented at the annual meeting of the Wire and Cable Section was supplied through the courtesy of NEMA and such portions as are relevant to the interests of our readers have been abstracted.

Consumer and business confidence in the future is strong and "many factors are converging to push new construction activity to record levels," declared **Walter W. Schneider,** Chief of Construction Statistics of the United States Department of Commerce, Business and Defense Services Administration, in addressing key executives of the wire and cable industry at the Westchester County Club, Rye, N. Y., on April 21, 1956.

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Mr. Schneider's talk was one of the closing features of the annual spring meeting of the Wire and Cable Section of the **National Electrical Manufacturers Association,** with 125 leading industrialists in attendance. **A. D. R. Fraser,** President, **Rome Cable Corporation** and Chairman of the Section, presided at the meeting. The Convention Chairman was **B. F. Ilsley,** Manager, Wire and Cable Department, **General Electric Company.**

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Mr. Schneider based his belief in continuing good business for the wire and cable manufacturers, on the fact that millions of dollars in their products are used in buildings of all types. Confidence in the future is indicated, the Government speaker said, by statistics which show that life insurance assets are up 6%, building and loan funds up 20%, corporate profits up 27% and disposable, personal income up $16,000,000,000.

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Despite this prediction he cautioned that there are some elements present and around the corner that may conspire to cloud the picture. Among them he cited shortages in window glass, cast iron soil and pressure pipe, cement and vitreous China plumbing fixtures. To these, he said, could be added rising prices and, perhaps, some labor shortages. If such elements, which he termed "safety valves," were not present the volume of construction in 1956 might well surpass the "10% gain over 1955 volume."

Metals Problems

Dr. Joseph Zimmerman, Editor in Chief, Daily Metal Reporter, informed listeners that the "behavior of the copper market has confounded the prophets and confused the experts," adding that every time the price of copper looks vulnerable, it "manages to squeeze out of a difficulty and go to a still higher level." That was the situation throughout 1955 when the price rose from 30 cents a pound to 43 cents a pound. The present price—46 cents a pound—is the highest at which copper has sold since Civil War days.

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The cause of this situation, he laid to "the insatiable demand for copper here and abroad, the fear of shortages and pressures by the Chilean Government, plus the crippling strikes that took place last year in Northern Rhodesia, Chile and the United States." These events, he stated, caused "a loss in production of about 160,000 tons, and were responsible for the succession of price advances."

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"The present price confusion in copper is greater and more serious than it has ever been before. Copper producers themselves are not particularly happy with the high price at which their metal is selling and some have been trying to bring the price back to what they regard as a reasonable level. They may succeed in doing so if there are no strikes in the copper producing industry this year," he concluded.

Aluminum Supply Increased

An increase of 59% in the use of aluminum in electrical applications by 1960 over that used in 1955 was forecast by **Irving Lipkowitz,** Assistant to the President, Reynolds Metals Co., in his address. This predicted gain, he said, would total 350,000 tons, representing a 162% increase over the amount used in electrical applications in 1950.

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He cited "the supply and price advantages of aluminum as the fundamental reasons for its rapidly growing popularity in the electrical field."

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"The total aluminum supply has increased 87% during the past five years. In 1955, the 1,566,000 ton production of primary aluminum in the United States exceeded copper production. Even more important, the supply outlook far into the future is brighter for aluminum than for copper. The known economical reserves of aluminum ore are much larger and higher grade than those of copper ore. Also, aluminum ores now being used are 29 times as rich in metal content as the copper ores.

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"The price revolution in aluminum during the past 15 years has also helped attract electrical manufacturers to aluminum. Just before World War II—in 1939—the base price of aluminum was 80% higher per pound than copper. Today aluminum is 48% lower in price than copper. On a use basis, with one pound of aluminum doing the electrical work of two pounds of copper, aluminum is 74% less in price than an equivalent amount of copper."

Many Subjects Covered

A series of other talks of importance to the wire and cable manufacturers, as well as to the electrical industry as a whole, were presented. Highlights of these addresses and subjects covered follow:

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A. R. Lee, Application Engineer, Construction Materials Division, **General Electric Company** (Glass Treated Silicone Generator Leads) —"Increasing demands for electric power in recent years has presented problems in utility and industrial plants where existing cables are no longer able to carry the additional loads required. Currently in new construction, space in many cases is at a premium and convention insulations are not adequate from a temperature standpoint to carry the loads involved. In this connection, the Wire and Cable Department of the General Electric Company has conducted extensive tests on a cable utilizing G.E. SE-100 silicone rubber-coated glass tapes as an insulation. Such a cable is designed for operation at a rated conductor temperature of 125 Centigrade for voltages up to and including 15KV and possibly higher."

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Although cables constructed with silicone rubber-coated glass tape are relatively expensive compared to cables with conventional insulation, he said, they may afford an economical solution to many problems.

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M. Van Lear, Bureau of Ships, **United States Navy** (Shipboard Cable)—"The Department of the Navy is the largest single producer of electrical power in the United States. It also is the largest consumer, since the power generated aboard ship is consumed on shipboard. This energy is distributed throughout the ship by cables which penetrate a variety of environmental conditions that seldom are encountered ashore.

★ ★ ★

"**Shipboard** cable is necessarily a specialty product and specialized facilities, materials and operator skills are required for its fabrication. The evolution of shipboard cable design has and will continue to keep pace with the latest developments in the art so as to assure to the Navy the maximum degree of military effectiveness and safety at sea."

★ ★ ★

G. E. Rolston, Vice President, **Rome Cable Corporation** (Non-returnable Reels)—"The desirability of using a non-returnable reel for building types of wire and cable has been recognized for many years. Past attempts to reach this goal have been made, but trials were discarded because they could not be economically justified. Rome Cable has had the problem under study for a year, however, and now believes that its experience shows the non-returnable reel is proving very satisfactory in attaining the desired result."

★ ★ ★

S. J. Rosch, Cable Consultant, **Anaconda Wire and Cable Company** (Cooperative Activities with Insulated Power Cable Engineers Association) — "Ever-increasing demands by the electrical industry for wires and cables capable of meeting new and unusual requirements made necessary through modern environmental factors and conditions, require a reappraisal of existing standards for insulated wires and cables. To meet this situation, the Insulated Power Cable Engineers Association, in conjunction with NEMA, is studying factors involved in providing electrical conductors capable of meeting the foregoing requirements.

★ ★ ★

"**The** study will cover such categories as communications, control and high and low voltage cables made with a variety of old and new materials for installation underwater, overhead, in underground ducts, for direct burial in the soil and for the interior of residential and industrial buildings."

★ ★ ★

Dr. E. G. Sturdevant, Technical Director, **United States Rubber Company** (Developments of Molded Cable)—"Federal Mines regulations now require either a grounding conductor in a cable or an equivalent device for maintaining the frames of off-track mining machines in underground mines at ground potential. This requirement expired as of August 1, 1956, since a 'certified' alternate device now is available for 250 d-c circuits. The rather frequent breaking of the grounding conductor in parallel Type G cables has probably contributed to the development of the 'equivalent or alternate device.'

★ ★ ★

"**A** grounding conductor in the cable still is required on 500 d-c circuits, on all a-c circuits, and on hand drills not provided with contactor controls. The grounding conductor will still be required on 250-volt d-c circuits in those states having laws covering its use. Therefore, even though an alternate device has been developed, significant quantities of Type G parallel cables will continue to be required."

★ ★ ★

R. A. Schatzel, Vice President, **Rome Cable Corporation** (Underwriters' Laboratories, Inc., Investigation of Raceway Fill) — Mr. Schatzel discussed the project, established in 1954, to determine the maximum number of conductors and permissible rating when more than nine conductors are installed in a metallic raceway. The project was sponsored by the American Iron and Steel Institute, with NEMA and the National Electrical Contractors Association cooperating. Wire and conduit used in the tests were contributed by NEMA member companies.

★ ★ ★

"**The** investigation is now complete, and a final report is being prepared for submittal to the Correlating Committee of the National Electrical Code for its consideration for incorporation in the Code. This will provide the first guide for rating more than nine conductors when installed in conduit and other raceways, such as underfloor ducts."

★ ★ ★

(*Please turn to page* 1039)

New Design of Wire Insulating Head For Extruders

By N. Okazaki
Technical Adviser
The Sakaguchi Special Electric Wire Company
Tokyo, Japan

The author has designed an attachment for extruder heads of conventional construction, the effect of which is to eliminate unbalanced pressure conditions and permit of perfect concentricity of the wire and the extruded coating. He is a life member of The Institute of Electrical Engineers of Japan.

Main Requirements for Extruder

The following are the principal requirements for an extruder:

1. **Quick and accurate regulation of centering.**
2. **Cover multi-core cable so as to fill up its valleys perfectly.**
3. **Centering under a condition that axis of guider tube is coincident with that of die.**
4. **Maintain a space between tip and entrance of die land as large as required.**

★ ★ ★

Notwithstanding that efforts have been made from time to time by many designers and makers, these requirements, to my regret, so far have not been satisfied.

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The occasion for this article is the development of a new, improved design for extruders that will meet the foregoing requirements.

Present Practice of Design

Generally speaking, at present, nearly every extruder is so constructed that axis of die is perpendicular to that of screw. In this type of extruder, the flow of material in the die holder is accordingly larger on the screw side of guider tube than on the other; therefore when axis of guider tube coincides with that of die flow coming out from die, it bends sharply from the screw side to the other.

★ ★ ★

This is due to an unbalance of pressure which exists in die holder, because the pressure on screw side is much higher than on the other.

This condition is absolutely unavoidable owing to a construction in which the screw is placed perpendicular to guider tube; i.e., flow has to change its direction 90 degrees from screw to the die.

★ ★ ★

In such an extruder, the die holder is provided with four push bolts by which the die or tip is moved laterally to make the quantity of flow equal on both sides; i.e., by lessening the clearance of high pressure side and increasing the same of the low pressure side; as a result the coincidence of two axes of tip and die are compelled to assume an eccentric state.

★ ★ ★

In this case core of the cable, on passing through the tip and die, is pressed hard against the low pressure side in the space between the tip and the entrance of the die land due to the unbalance of pressure.

★ ★ ★

Accordingly, if the space is kept large enough, for instance 10 millimeters or more, the cable may not be pulled out through die owing to a resistance caused by the side-pressing force; therefore we should set the space, for example, 5 millimeters or less, in case the cable core is thin or soft, to minimize the side-pressing force.

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With such construction of the die assembly, we must purposely break the coincidence of two axes, in spite of the fact the two axes should fundamentally be in perfect coincidence to cover the cable theoretically concentrically, unreasonable indeed from designer's point of view.

★ ★ ★

In some cases, one may notice, when the clearance above the guider tube slightly differs from that below the same, owing to an inaccurate mechanical finish, the material may flow spirally around guider tube on the way to die.

★ ★ ★

In this case the nature of unbalance of the flow will be a complex one and accurate centering will not easily be effected.

Western Electric's Special Extruder

In extruders for continuous vulcanization in rubber covering of wire, a special die assembly design has been adopted by the Western Electric Company. In this system, I have been told, when the wire is covered with a special rubber compound set, "A" shall be inserted into the cross head, by which the flow of material will be balanced for a certain range of wire sizes, where the two axes of tip and die are coincident, but the set "A" shall be changed for set "B" for other ranges of wire sizes, and so on.

★ ★ ★

The system is good for the mass production of special rubber covered wire, using special extruder. But the flow balancing mechanism is not of universal type, therefore it is not ideal for general use, other than mass production.

New Design by the Writer, No. 1

In this system the balancing method is a universal type, one set of attachments is satisfactory for an extruder irrespective of size of wire or kind of covering material, always adjustable under a condition where the axis of die is perfectly maintained concentric to that of tip and the condition is never broken in balancing.

Special Features of the Attachment in the New Design

1. An attachment is inserted into the die holder to regulate the flow, by means of turning a small screw head which is fixed on the outside of die holder, to achieve a perfect balance.
2. No set bolt is provided, so that it is never necessary to move the die or tip laterally.
3. As the axis of die is permanently fixed concentrically with that of tip we can maintain in the space between the tip and entrance of die land as large as required.
4. There exists no side-pressing force in the space between the tip and entrance of die land after the regulation has been completed to balance the flow.
5. As the regulation work is not done by haphazard trial, but by a fine adjusting operation, the wire will be covered theoretically concentrically with the material.

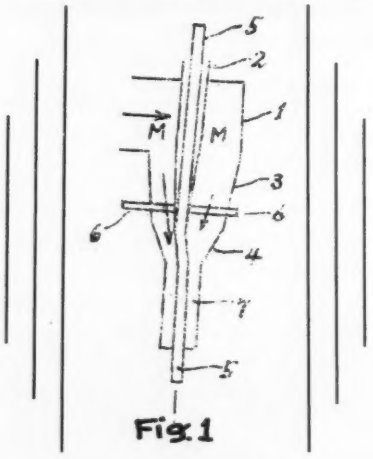

Fig. 1

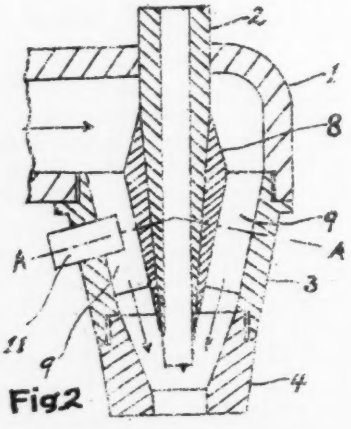

Fig2

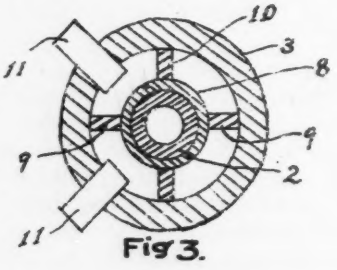

Fig 3.

Description in Detail

All the drawings shown are skeletons to show the principle only.

★ ★ ★

Fig. 1.—Shows a horizontal section of the cross head with a guider tube, die holder, die and a cable core which is being covered with material "M" in an ordinary system.

★ ★ ★

Fig. 2.—Shows a horizontal section of the cross head and die assembly of the new design.

★ ★ ★

Fig. 3.—Shows the section cut by "A-A" of that shown in Fig. 2.

★ ★ ★

Fig. 4.—Shows an example of the actual mechanism used to regulate and how to move the regulation rods.

★ ★ ★

Figures on these drawings in Fig. 1 to Fig. 4 show respective parts as follows:

1	cross head
2	guider tube
3	die holder
4	die
5	cable core
6	push bolt to move the tip
7	material "M" coated on cable core (5)
8	axis fitting cylinder
9 & 10	guide frame
11	regulator rod
12	screw part of regulator rod
13	bevel wheel to drive regulator rod
14	centre bevel wheel to drive the two on both sides
15	female screw to drive (12)
16	head of (14)

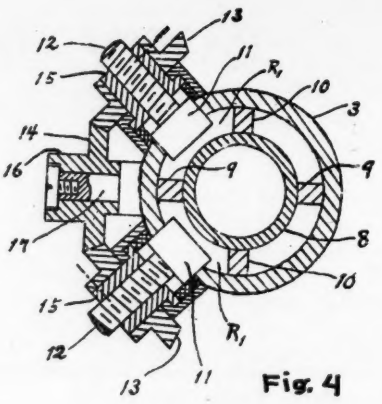

Fig. 4

17	fixed axle
R1	path for high pressure side
C	space between tip and die

★ ★ ★

In Fig. 1 each of the two arrows show respective size of flow on each side in the die holder, and it is shown that the cable core is pressed against by the unbalance of two pressures where the die was shifted to the right hand side until the left side thickness of the coating becomes equal to that of right; the bigger the space "C", the greater the pressure.

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Figs. 2, 3 and 4, show the essentials of the new attachment; the "axis fitting cylinder" has four guider frames, each 90 degrees apart on its outer surface, the inner conical surface of which fits the outer conical surface of the guider tube, and the outer surfaces of the four frames form a conical surface to fit the inner conical surface of die holder.

(*Please turn to page* 1038)

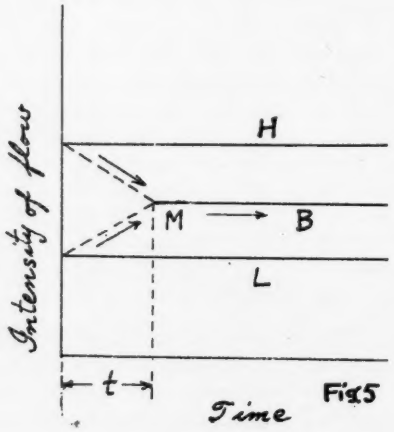


Fig5

Making Wire Carts for Supermarkets

by Fred Edmunds
Bethlehem Pacific Coast Steel Corporation
Los Angeles, California

This is the story of a West Coast wire product manufacturer who has specialized in the production of wire carts, work tables and stock carts for retail food dispensers.

Out of a fascinating merchandising method, introduced shortly before World War II, has come another symbol of American prosperity—the shiny, wheeled grocery shopping cart, laden with groceries and propelled by the American housewife.

★ ★ ★

A mainstay in the development of rapid self-service in today's supermarkets, the grocery shopping cart itself is a result of evolution. Original models were hand-carried wicker baskets followed by cumbersome folding varieties. At **Technibilt Corporation** in Glendale, California, the importance of wire comes into focus in this connection. Technibilt workers take gleaming coils of new wire and shape the grocery shopping carts with which we are familiar by modern, efficient production methods.

★ ★ ★

Sturdy enough to carry the heaviest grocery loads, rear panels of the carts fold inward to allow "nesting" of the carts when not in use to reduce storage space. Many models, in addition, even feature folding "baby" seats.

★ ★ ★

High speed, quality steel production is playing a major part in the manufacture of not only these shopping carts, but numerous other material handling equipment items as well. Display cases, pastry trays, bulk carton transport carts, to name a few. But all have one thing in common. They are fabricated from economical wire, maintain a neat appearance and are easily cleaned by the market operator.

★ ★ ★

Floods of new steel stream from furnaces, high speed rolling mills shape the billets into coiled rods and Bethlehem Pacific completes the production cycle by drawing rod into wire in a variety of sizes and kinds.

★ ★ ★

One kind, Extra Clean-Extra Bright, in sizes ranging from 13

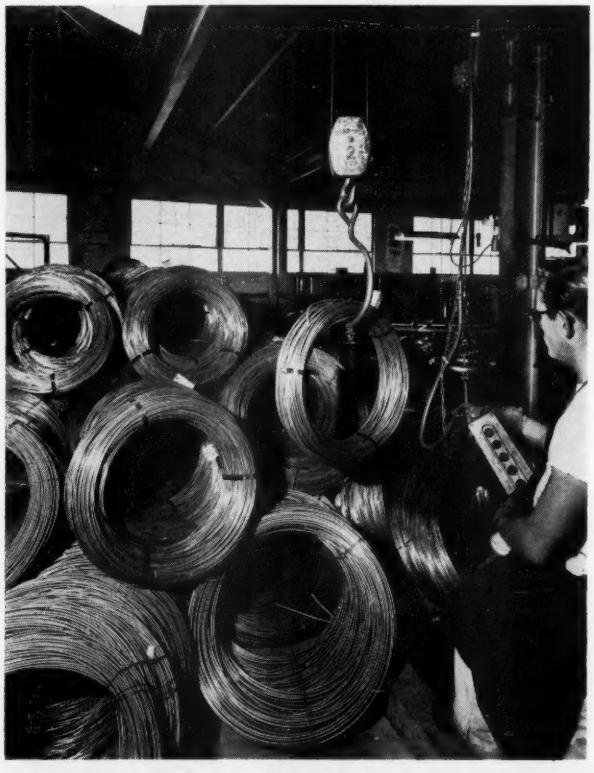


Fig. 1—Start of shopping cart as coils of new wire are sorted and lifted over to straightening and cutting machines. * * * * * *

Fig. 2—Ready for the frame of the holding fixture, basket sections are positioned with longitudinal stiffeners and spot welded. Rear panel, hinged to allow nesting, is fabricated separately. * * * * *

Fig. 3—Spot welding lengths of wire, held in fixture, completes bottom mesh of basket. Protruding length of wires will be folded upward to form basket sides. Wire is drawn to exacting gauges by Bethlehem Pacific.

Fig. 4—Technibilt inspector examines completed basket ready for final assembly. Plated for protection against the salt air corrosion, these shopping carts are used throughout the U. S. * * * * * *

gauge to one-half inch meet the needs at Technibilt. Straightened and cut to desired lengths, wire stocks are bent to the proper shapes on hydraulic bending machines, some of which have been designed and manufactured by Technibilt to handle special jobs.

★ ★ ★

In the fabrication of the basket, wire is positioned in fixtures and spot welded together to form the mesh for the bottom. Extended lengths of the wire are then bent upward in other formers to rough in the shape of the basket-to-be. Longitudinal stiffeners are then inserted and welded in place.

Fig. 5—Final assembly of carts completes the transition of wire from Bethlehem Pacific's Los Angeles Wire Mill to new cart for housewives in grocery markets. * * * * * *

★ ★ ★

On separate assembly lines, rear gates for the basket are fabricated along much the same lines. Cart chassis are built up of sturdy steel tubing and cold rolled steel flat sections. Final assembly, inspection and shipment to customer follows a complete chrome plating of every piece.

★ ★ ★

Triple chrome plating helps meet the threat of the worst "enemy" of the grocery shopping cart — the corrosive air of West Coast beach communities. Since most supermarket managements permit customer use of these handy carts from the check-out stands to the family automobile in the parking lot, carts take a much worse beating in the salt-laden air than at the hands of a harassed mother and an army of toddling tots.

★ ★ ★

Technibilt produces some thirty different models in its market line including shopping carts, mobile work tables and stock carts for a variety of items. More than 140 employees are currently working at this highly specialized craft, one that still requires a considerable amount of the handwork of craftsmen.

★ ★ ★

At the head of this versatile concern are two former World War II Navy veterans, **George Hoedinghaus,** President, and **Ralph G. Sanders,** Secretary-Treasurer. Mr. Hoedinghaus is a former executive with the American Institute of Banking. Mr. Sanders formerly taught school in the San Bernardino County (California) school system and for a time prior to his entry into business was superintendent of the Yucaipa, California school.

★ ★ ★

Technibilt, like hundreds of

(*Please turn to page* 1057)

ASTM Standards on Copper and Copper Alloys

All of the ASTM Standards pertaining to copper and copper alloys, which were developed by ASTM Committee B-5 on Copper and Copper Alloys, Cast and Wrought, and related standards developed by Committees B-1 on Wires for Electrical Conductors and B-2 on non-Ferrous Metals and Alloys, have been compiled into a compact, handy volume. The December, 1955, edition of ASTM Standards on Copper and Copper Alloys includes in their latest form 127 ASTM Standards — 110 specifications, 12 test methods, 2 recommended practices, 2 classifications (of coppers and copper-base alloys), and 1 definition of terms.

★ ★ ★

Standards cover copper, copper-alloy, and copper-covered-steel electrical conductors; copper and copper-alloy plate, sheet, strip, and rolled bar; copper and copper-alloy rod, bar, and shapes, and die forgings; copper and copper-alloy wire; copper and copper-alloy pipe and tube; copper-alloy ingot; copper-alloy castings; copper and copper-alloy filler metal; and methods of test for copper and copper-alloys.

★ ★ ★

Of the material included in this compilation 50 of the specifications have been revised and a new specification for threadless copper pipe has been added since the previous edition.

★ ★ ★

Copies of this 654-page book can be obtained from ASTM Headquarters, 1916 Race Street, Philadelphia 3, Pa. at $5.75 per copy.

First Surplus of Copper Since 1940 Reported

The copper wire on brass mill fabricating statistics for the month of June as compiled by Copper Institute show that actual consumption of refined copper in June underwent a decrease of about 11,300 tons to a total of 111,109 tons. During the same month, the primary producers delivered to the fabricators a total of 128,573 tons of refined copper, so that fabricator intake exceeded consumption by 17,464 tons. During the same month the copper content of product sales by the fabricators dropped about 17,000 tons to a total of 88,854 tons, the smallest figure to be reported since February 1954.

★ ★ ★

As a result of the intake excess over consumption, the stocks of refined copper in the hands of the fabricators underwent a further rise of about 16,000 tons to a total of 451,126 tons. Meanwhile, unfilled orders on the books of fabricators took another sharp decline of about 22,000 tons to a total of 227,097 tons, the smallest backlog of orders since April 1955.

★ ★ ★

The showing of the June statistics with respect to consumption, stocks and unfilled orders was generally expected by the industry at large, but the outstanding feature of the statistics is the fact that for the first time since the month

MICROMETER PRECISION — MICRO-WELD TRADE MARK REGISTERED

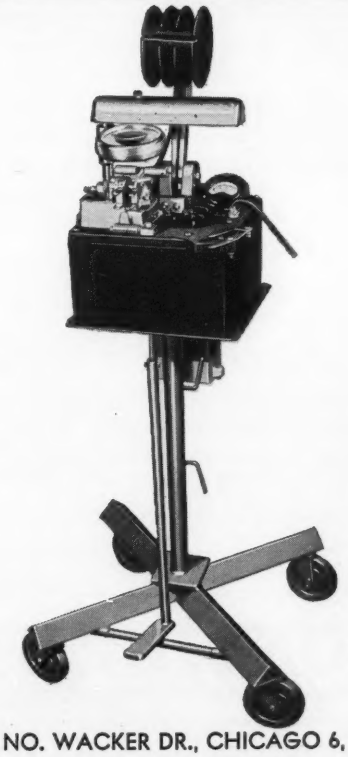
MODEL S.E.M.T. MICRO-WELD BUTT WELDER

This welder was designed and developed expressly for welding all types of fine wire: Aluminum, Copper, Brass, Bronze, Steel and Steel Alloys, ranging in size from .005" to .020" diameter.

Unit design of frame, transformer and power sub-assemblies permit other range of sizes to suit requirements.

Equipped with a temperature indicating annealing and tempering device, voltage regulator and meter to compensate for voltage fluctuation, wire cutters, extra large 5" diameter magnifying glass, fluorescent light and extension cord. Welder can be supplied for bench mounting, or mounted on 4-wheel truck.

The adaptability of this unit for welding all types of wire, either ferrous or non-ferrous, in sizes from .005" to .020" diameter, makes it ideal for the fine wire manufacturer.



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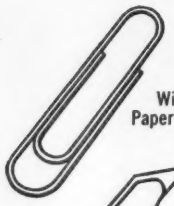
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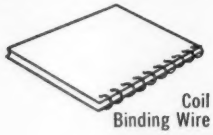
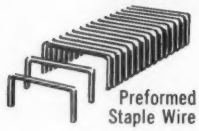

Coil Binding Wire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of December 1940, the domestic fabricating industry possessed an amount of refined copper in excess of all operating requirements.

Symposium on Atmospheric Corrosion of Non-Ferrous Metals

This symposium covers one of the most comprehensive test programs for the measurement of atmospheric corrosion properties of non-ferrous metals and alloys ever attempted. The exposure tests were started twenty-seven years ago by Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys.

★ ★ ★

The materials utilized included 24 wrought alloys of zinc, nickel, copper, lead, tin, and aluminum. These were exposed at nine significant localities across the country and evaluated after periods of 1, 3, 6, 10 and 20 years, embracing about 9000 test specimens.

★ ★ ★

The test report lists all data gleaned from these specimens and nine papers discuss in detail the significance of these results in each metals field.

★ ★ ★

Copies of this publication can be obtained from the **American Society for Testing Materials,** 1916 Race Street, Philadelphia 3, Pa. at $2.75 each. 164 pages.

Belgian Concern Organizes Steel Wire Firm Here

Formation of **Bekaert Steel Wire Corporation** as a New York corporation and as a subsidiary of **Trefileries Leon Bekaert** of Zwevegem, Belgium, one of Europe's largest wire manufacturers, has been announced by **Alex J. van Goylen,** who has been named president of the new corporation.

★ ★ ★

Mr. van Goylen was formerly general U. S. representative of the Bekaert firm, which was formerly known in this country as Bekaert Steel Wire Works.

★ ★ ★

New offices have been estab-

lished at 655 Madison Avenue, New York.

★ ★ ★

Bekaert Steel Wire Corporation will render technical service and carry on general administrative work in connection with Bekaert products in the United States.

★ ★ ★

Through nine sales agents in the United States—located in New York, Los Angeles, San Francisco, Seattle, Portland, Kansas City, New Orleans, Savannah and Clearwater, Fla.—Trefileries Leon Bekaert sells a wide variety of high carbon and low carbon steel wire and steel wire products in this country.

ASM to Meet in October

The 1956 National Metal Exposition and Congress — the Metal Show — to be held in Cleveland from October 8th thru the 12th, will be the largest in the 38 year history of the show. **Wm. H. Eisenman,** general manager, and national secretary of the **American Society for Metals,** sponsor of the industrial assembly, reports an exhibitor roster of 465 companies whose displays will fill the 250,000 square feet available in the city's huge Public Auditorium and Exhibition Halls.

★ ★ ★

Cleveland is one of three cities whose facilities provide adequately for the Show, theme of which for this year is "spend-to-save."

★ ★ ★

Strong emphasis on the cost-cutting economies of new equipment will be stressed more than ever this year.

★ ★ ★

All sessions of the National Metal Congress with its program of more than 150 technical papers will be held in four hotels of the city, each a headquarters for one of the four technical societies participating in the Congress.

★ ★ ★

The American Society for Metals will be quartered at the Statler.

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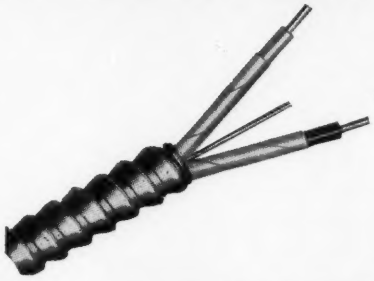

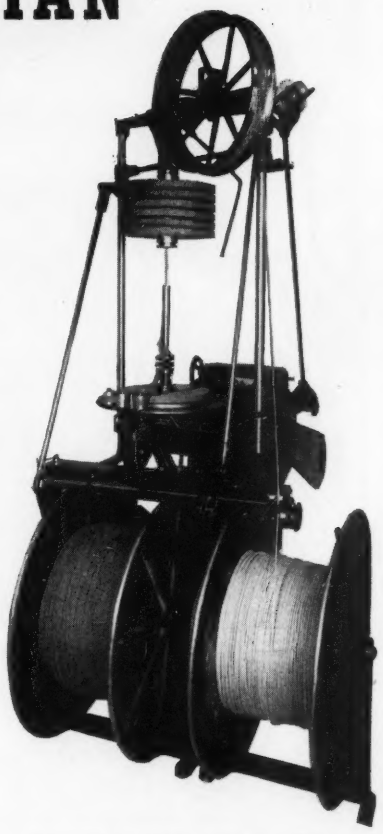

An improved serving machine for applying crepe paper on conductors used in the manufacture of armored cable.

- Equipped with adjustable traverse, supply and windup stands, windup driving mechanism, electric stop-motion and capstan release mechanism.
- Equipped for adjusting lay of paper strip.
- Rate of production: 5,000 ft. per hour possible, depending upon width of material and lay.
- Serving head speed 560 R.P.M.
- Driving pulley 8" diameter; 1¾" belt. Speed 260 R.P.M.
- Capstan 18" diameter, 3" face.
- Opening through serving head ⅝" diameter.
- Supply packages 16" diameter, 3" diameter core.
- Supply tube will hold 8 reserve packages of 1" wide paper.
- Maximum power requirement ¾ H.P.
- Motor drive furnished upon request at additional cost.
- Counter for measuring production in feet.
- Stands will accommodate reels 30 inches in diameter, with overall width up to 16 inches.
- Reels not included with machine.

Note: Serving head normally runs clockwise, but can be made to run counter-clockwise if requested.

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Now you can enjoy lower freight charges and greater protection against damage with the new, lighter weight NYECO steel reels. They cost so little more, last 12 times longer than wooden reels, require minimum maintenance. Rugged weatherproof, splinter-proof, warp-proof protection protects costly cable against damage due to dropping, bouncing, rough handling.

Think it over and you'll agree that it doesn't pay to risk an investment of thousands . . . and your reputation . . . on inferior reels.

* These leading mills are just a few of the many that use **NYECO** Steel Reels: **ANACONDA, GENERAL CABLE, OKONITE, PHELPS DODGE, ROEBLING, WESTERN ELECTRIC**

- *ANY QUANTITY*
- *ANY SIZE*
- *ANY LOAD*
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NEW YORK ENGINEERING COMPANY

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TELEPHONE: WHitehall 4-5380 **CABLE:** NYECO, N. Y. **PLANTS:** YONKERS, N. Y.

Wire Forming Unit for Making Pipe Cages

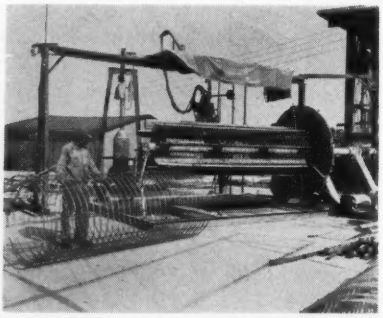
The N. C. Products Company, Raleigh, N. C., is now producing 12-foot, 60-inch extra strength pipe for culverts, sewage disposal systems and military installations through the use of a wire forming unit for making pipe cages produced by the Sturtevant Mill Company.

★ ★ ★

For this purpose bright basic steel ASTM 82-34 is used for pipe diameters of 72 inches through 36 inches.

★ ★ ★

Two different size wires are used: No. 1 gauge of ¼-inch diameter in coils of 2500 feet, and No. 4/0 of 13/32-inch diameter in coils of 1200 feet long. These coils weigh from 300 to 500 pounds each, and last year this one company alone used 250 tons of wire for this purpose.



Cage is inspected after completion and before being placed over pipe mold. An outer mold is then placed around the cage and the inner mold and concrete poured. * * * * * *

★ ★ ★

The cages are made in a deceptively simple fashion. Coils of wire are placed on a vertical mandrel. Then the end of the coil is attached to a fair-lead for spacing and attached to the face plate end of the machine. The wire is then pulled on the machine. After the inside cage is rolled, cross wires are welded in. Then boards are bolted to each of the 9 arms of the cage form.

★ ★ ★

The outside cage is formed in the same manner and cross wires are welded in it. Both inner and outer cages are then tied together

so they can be handled as a single unit. The cage form arms are depressed and the cage is removed easily by means of an electric hoist. The mandrel on which the wire is rolled is collapsed and expanded 2 inches on the diameter by means of an air cylinder which operates collapsing cones inside the mandrel cages very easily. This feature simplifies the problem of removing the cage.

★ ★ ★

The wire used for this operation is supplied by the **Tennessee Coal & Iron Division, U. S. Steel; Bethlehem Steel Corp.; Pittsburgh Steel Co.;** and **Republic Steel Corp.**

West Coast Plant Enters Telephone Wire Field

The Sequoia Process Corp., Redwood City, Calif., has announced that it has started the marketing of telephone cable from the west's first "all-plastic" cable manufacturing plant.

★ ★ ★

In entering the telephone cable market, Sequoia will concentrate initially on supplying telephone companies located in the eleven western states. Sales will be made to jobbers supplying the independent companies located in the area, as well as to the Bell system. Sequoia's initial shipment of cable has already gone out to the Pacific Telephone and Telegraph Company for anticipated use in the San Francisco Bay area.

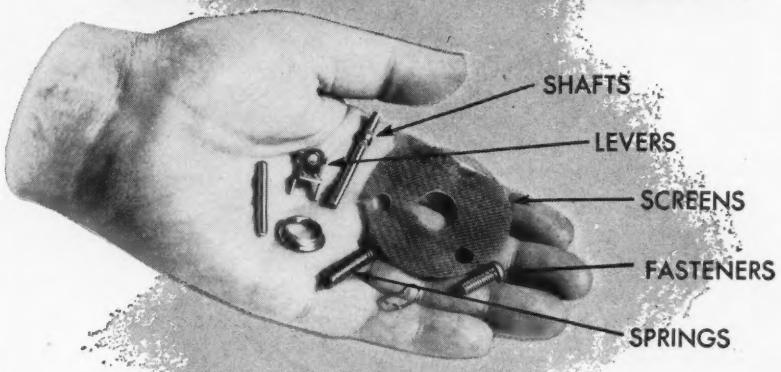
★ ★ ★

Paul M. Cook, President, said that the move represents a logical extension of Sequoia's more than five years' experience in manufacturing precision plastic-insulated products for the electronics, avionics and guided missile industries, as well as the company's basic desire to increase the diversification of its products.

★ ★ ★

Completed this spring, Sequoia's new Redwood City plant will be the only plant west of North Carolina specializing in quantity production of modern, plastic-insulated telephone cable. A recent development

ARE *small* PARTS CAUSING YOUR PRODUCT FAILURES?

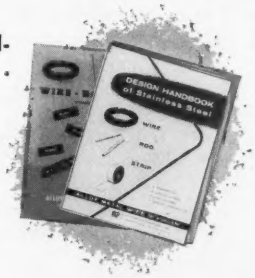


It Will Pay You To Use ALLOYS

How many times can you trace your product failure to the corrosion, wear or breakage of some small part? A screw . . . a shaft . . . small spring . . . a gear or other seemingly insignificant part? In most cases the failure can be blamed on the material from which the part was made. The use of Nickel Alloys or Stainless Steel Wire, Rod or Strip for these parts could have saved many dollars in service and replacement costs because of their superior engineering properties.

How much more will alloy materials cost? Actually, on small parts, fabrication, finishing and other manufacturing costs will more than likely far overshadow material cost. You will find that the extra cost of using alloys will be insignificant compared with the benefits in longer service life, lower maintenance costs and fewer customer complaints.

For informative technical data on our alloys . . . and for some good ideas . . .



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ALLOY METAL WIRE DIVISION

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Prospect Park, Pennsylvania

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Whether you're looking for steel reels, spools or bobbins, you're sure to find the quality and service you expect under the world-famed *Apco Mossberg* name.

Backed by more than half a century of experience, *Apco Mossberg* engineers and craftsmen are prepared to meet your complete requirements for standard or custom-made reels, spools and bobbins . . . each to exact size, balance and trueness.

Be sure to look for the *Apco Mossberg* name the next time you consult your buyer's guide or product register. Our engineering and service departments will gladly submit recommendations based on your specifications at no obligation.

Write, wire or phone Attleboro 1-0340 collect today.

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Toronto, Ontario, Canada

APCO MOSSBERG COMPANY
LAMB STREET, ATTLEBORO, MASSACHUSETTS

in telephone cable manufacturing, plastic insulation offers numerous advantages to cable users, including light weight, low installation and maintenance costs, and complete moisture protection.

★ ★ ★

To supplement production at the Redwood City plant, plans are now also underway for the construction of a second Sequoia telephone cable facility in Kansas City, Mo., which will supply the midwest market. The Kansas City plant will be in operation early in 1957.

★ ★ ★

Initially, Sequoia's telephone cable will be made in sizes from six to 202 pair; but later, cables of up to 404 pair will be produced. All cables will exceed REA PE14 aerial and duct cable specifications. The company also produces "Hyrad," a new irradiated plastic insulating material.

New Ripping Machine Introduced by Dykrex

Dykrex-Roos, manufacturers of wire die finishing machinery, announces the introduction of a new, heavy duty ripping or roughing machine for large dies up to 3# I.D.

★ ★ ★

This heavy duty ripper does the work of an expensive precision lathe, but is priced at a fraction of the cost. It permits a skilled or unskilled die room operator to finish larger dies without special cutting tools, internal grinders or precision lathes, and eliminates completely the need for an expert lathe or grinder operation.

★ ★ ★

Made especially for mills using large dies, this new ripper uses the time-proven principle of the work table, holds the die, moving in a counter-clockwise motion to the movement of the lapping pin. This same principle is used in all other Dykrex lapping machines.

★ ★ ★

For additional information or prices, contact your tool room supplier or write to **Dykrex Corporation of America,** P. O. Box 9022, Northeast Station, Newark 4, N. J.

Collapsible Materials Handling Racks

Lightweight, but strong and durable, these new wire racks are collapsible for easy, compact storage. Used for transporting components from one processing unit or machine station to another, they require a minimum of floor space when not in actual use. The collapsible design reduces packaging and shipping expense.

★ ★ ★

Open construction of removable wire shelves prevents accumulations of dirt and facilitates cleaning. Dished wheels provide complete maneuverability. Racks are

Collapsible Wire Racks

galvanized for corrosion resistance and longer life.

★ ★ ★

For easy nesting of parts, wire formations in the shelves can be profiled to the particular products being handled, as in shoe rack above. Dimensions of the racks and the individual shelves can be modified to meet specific plant and material requirements.

★ ★ ★

For further information, write **E. H. Titchener & Co.,** 67 Clinton Street, Binghamton, N. Y.

New Handbook on Aluminum

One of the most comprehensive reference handbooks on aluminum ever to be compiled has been made available to industry by **Aluminum Company of America.**

★ ★ ★

Entitled the "Alcoa Aluminum Handbook," the new booklet provides an up-to-date successor to

is
- Hot-Extruded
- Annealed
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for highest strength and quality

Titan Brass Wire has precisely uniform gauge . . . color . . . texture . . . temper . . . is free from physical defects. For making highest-quality rivets, bolts, nuts, eyelets, fasteners, screws, studs, binding posts, terminals, washers, pins and nails . . . order Titan Brass Wire. Compositions and tempers are supplied to meet every requirement. Let us help you choose the proper wire composition and temper for **Heading & Extruding**
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Write today for free folder "Titan Brass Wire" listing grain sizes, weights, tolerances and other data. Address: Customer Service Division, Titan Metal Mfg. Co., Bellefonte, Pa.

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Quality Alloys by Brass Specialists

NELCO TRADEMARK

finishes for wire and cable constructions

Formulated by specialists . . . backed by over 30 years of experience in working with wire manufacturers. Nine standard finishes are listed below. Many more are available. Consider how you can use them or how we can help you to select the exact finish for your particular problem.

NL 7147—NELCO Cable Coating
General radio hook-up and push-back wire constructions

NL 7147-S NELCO Clear Cable Coating
Similar to NL 7147 but with fungicidal agent

NL 8223—NELCO Clear High Heat Resistant Cable Coating
Meets requirements of automatic primary wire manufacturers

NL 8244—NELCO Nylon Cable Coating
A penetrating bonding coating for nylon braided constructions

NL 9776—NELCO Clear Cellulose Acetate Cable Coating
For switchboard hook-up wire constructions

R 1407—NELCO Nylon Cable Coating
For wire constructions meeting MIL-W-5086

R 2055—NELCO Anti-Fray Saturant
Prevents fraying of glass-braided wire constructions

R 4004—NELCO Flame Retardant Saturant
Good flame resistance, no color change

R 4026—NELCO High Temperature Resistant Cable Coating
Fluorinated coating for wire constructions meeting MIL-W-8777

Write for our Data Sheets giving complete information on these finishes.

Chemical Products CP CORPORATION

KING PHILIP ROAD • EAST PROVIDENCE 14, RHODE ISLAND

the now discontinued "Alcoa Aluminum and Its Alloys."

★ ★ ★

Complete information is given to enable a manufacturer to make the most advantageous choice of aluminum products to fulfill his particular need. This book contains information on alloy standards as well as the properties, sizes, and tolerances of mill products usually produced from them.

★ ★ ★

Subsequent sections in the 176-page book deal with wrought alloys; sheet and plate; wire, rod, and bar; extrusions; tube and pipe; electrical conductor; structural shapes; forgings, and casting alloys.

★ ★ ★

Sections on mill products discuss sizes, properties, and tolerances. The tables make it extremely easy to find complete information on any alloy in all of its fabricated thicknesses and sizes.

★ ★ ★

In all, 140 tables tell the Alcoa Alloy story. Copies of the "Alcoa Aluminum Handbook" are available by writing on a company letterhead to Aluminum Company of America, 781 Alcoa Building, Pittsburgh 19, Pennsylvania.

★ ★ ★

To Manufacture Aluminum Chains

The Columbus-McKinnon Corporation, Tonawanda, N. Y., one of the nation's larger producers of iron and steel welded chains, has entered a new field for the company—the manufacture of aluminum chains.

★ ★ ★

A company executive said production of the aluminum chain so far has been "very limited" and it has not been offered to the trade formally.

★ ★ ★

The chain is made for decoration purposes, for guides to enclose areas such as parking lots and for other uses.

Outstanding Personalities of the Wire Industry

Frank W. Bullock

Col. Frank W. Bullock, U.S.A. (Ret.) died on August 12, 1956, at the Walter Reed General Hospital, Washington, D. C. Since his retirement from the Army his home has been Brook Place Manor, Island Creek, Md. He was a member of **The Wire Association** since its organization in 1930.

★ ★ ★

Frank Bullock entered the Army in the first World War as a private in the Nebraska National Guard. He was given a battlefield commission as a Second Lieutenant in the Regular Army for conspicuous bravery in action. After the war he studied at Doane College and the University of North Dakota, graduated from the Army Industrial College, and later from the Harvard School of Business Administration. He served in the Army from 1914 until his retirement in 1947. For his military services he was awarded the Silver Star, the Legion of Merit, the

Col. Frank W. Bullock, U.S.A. (ret.)

Bronze Star, the Army Commendation w/2 Oak Leaf Cluster and a Special Presidential Citation, together with several foreign decorations.

★ ★ ★

Col. Bullock was a frequent speaker at Association meetings during his active Army career. In addition to his military attainments, he was a scholar and a student of philosophy, and his appearances before Association meetings will be remembered as delightful and worthwhile occasions for his audiences.

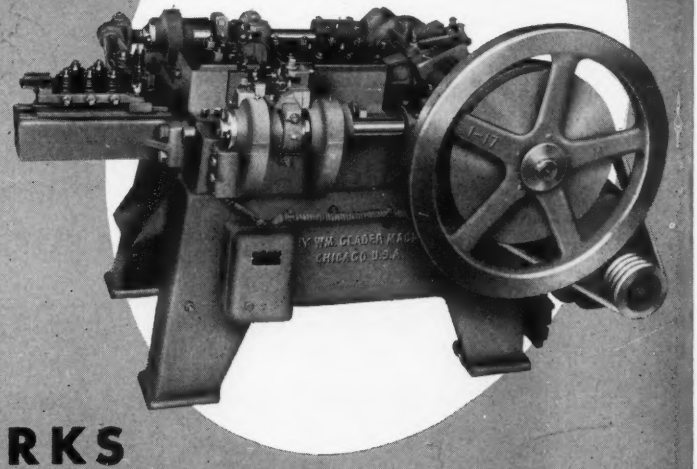
★ ★ ★

His widow, **Mrs. Florence Bullock,** will continue to reside at Brook Place Manor.

Buy Insulating Materials Company

Announcement is made by **W. E. Anderson,** President, that he and **M. G. Wallace** have purchased the business operating under the name of **Universal Insulations Ltd.,** Aurora, Ontario, Can., and will conduct it without change of policy or management under the new name of **Universal Insulations Company Ltd.** The concern manufactures varnished fabrics and tapes for electric insulation.

high efficiency — low cost
with GLADER wire nail machines



Eliminate costly down-time in the Nail Mill by replacing obsolete machines with new GLADER NAIL MACHINES . . . For tops in efficiency and economical operation use GLADERS.

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MACHINE WORKS

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Export Dept.: 122 East 42nd Street, New York 17, N. Y.

Canadian Electric Wire Company Announces Appointments

Edmund S. Rose, President and General Manager of **Standard Wire and Cable Limited** announces the following executive appointments: **Donald A. Campbell,** Secretary-Treasurer; **G. V. Taylor,** Plant Manager; and **C. W. Vogan,** Sales Manager.

★ ★ ★

Mr. Rose attended the University of British Columbia, and spent considerable time in Europe obtaining experience in wire and wire products. He was President of **Trudex Manufacturing Limited** prior to the change of Company name to the above. Mr. Campbell was formerly Chief Engineer of an Algoma Steel subsidiary development. Mr. Taylor has been a recognized authority in the technical development and production of wire and cable in Canada for the past twenty years. Mr. Vogan brings to Standard Wire, more than twenty-five years experience in the industry. He recently left Canada Wire and Cable after being associated with that Company for a quarter of a century. Directors of Standard Wire and Cable Limited are Messrs. **E. S. Rose, H. W. Knight Sr., H. W. Knight Jr.,** and **D. A. Campbell.**

★ ★ ★

The newly erected Plant of Standard Wire and Cable Limited is at 70 Wingold Avenue, Toronto 10, Ontario.

Buys R. J. Watters Company

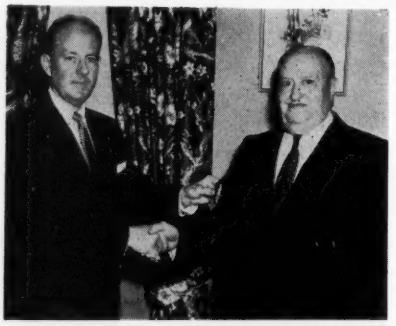
L. O. Burrell has announced his purchase of the **R. J. Watters Co.,** Buffalo 6, N. Y., and that he will conduct the business under the name of the **L. O. Burrell Company.**

★ ★ ★

The company manufactures Kleanrite pickling compound, Inhibit-Rite inhibitors, Surf-Klean, Foamrite and other pickling chemicals. It was founded by Mr. Watters in 1913 and will be continued by Mr. Burrell, formerly associated with him in the production and sale of these products.

Completes Fifty Years with Firm

Ralph B. Roth, vice president and secretary of **Ludlow-Saylor Wire Cloth Co.,** St. Louis, Mo., completed fifty years with the firm on June 21st. He was presented with an engraved watch by company president, **Duncan C. Dobson,** in honor of the occasion.



Mr. Duncan (left) presenting Mr. Roth with memento.

★ ★ ★

Mr. Roth, who started with the firm as a messenger in the old 4th and Elm Street plant in 1906, has served as Director of Purchases since 1942.

CAMDEN WIRE CO., INC.

Wire Fabricators

Producers of Quality Fine Wire Copper Conductors

EXTRA FLEXIBLE CONDUCTOR STRANDED OR BRAIDED

MULTIPLE ENDS OF SIZES .008 to .002

BARE · TIN or LEAD COATED · SILVER PLATED

Special Heavy Tinned Conductors for Hook-up Wire

40 MASONIC AVENUE • **CAMDEN, NEW YORK**

Presently, a vice president and director of The Wire Association, he formerly served three years as vice president of the St. Louis Purchasing Agents Association.

Shawinigan Resins Appoints Research Leaders

Shawinigan Resins Corporation, Springfield, Mass., has made known the appointment of **Drs. A. H. Markhart** and **J. A. Snelgrove** to the positions of group leader in the company's research department, according to an announcement by **Dr. R. N. Crozier,** technical director.

★ ★ ★

Dr. Markhart will be responsible for research on improving Formvar products and processes, the standard materials for magnet wire insulation. Dr. Snelgrove will conduct research designed to improve Butvar products and processes. These resins are used largely in the interlayer for automotive safety glass.

Carpenter Steel Assigns Six to Managerial Posts

Appointment of six men to managerial positions has been announced by **The Carpenter Steel Company,** Reading, Pa., producer of specialty steels.

★ ★ ★

Richard P. Evans has been named assistant to the vice president in charge of sales and will be responsible for executive contacts. He will be located in New York City. He was formerly district manager in charge of Carpenter's New York branch warehouse and office at Woodside, L. I., and has been associated with Carpenter since December 1939.

★ ★ ★

Robert P. Uhl, former branch manager of the company's warehouse in Dayton, Ohio, has been named New York District manager. He was Dayton manager since 1952, and has been with Carpenter since 1946.

Charles E. Miller has become branch manager of the Houston, Texas, area. He has been affiliated with Carpenter since 1946.

★ ★ ★

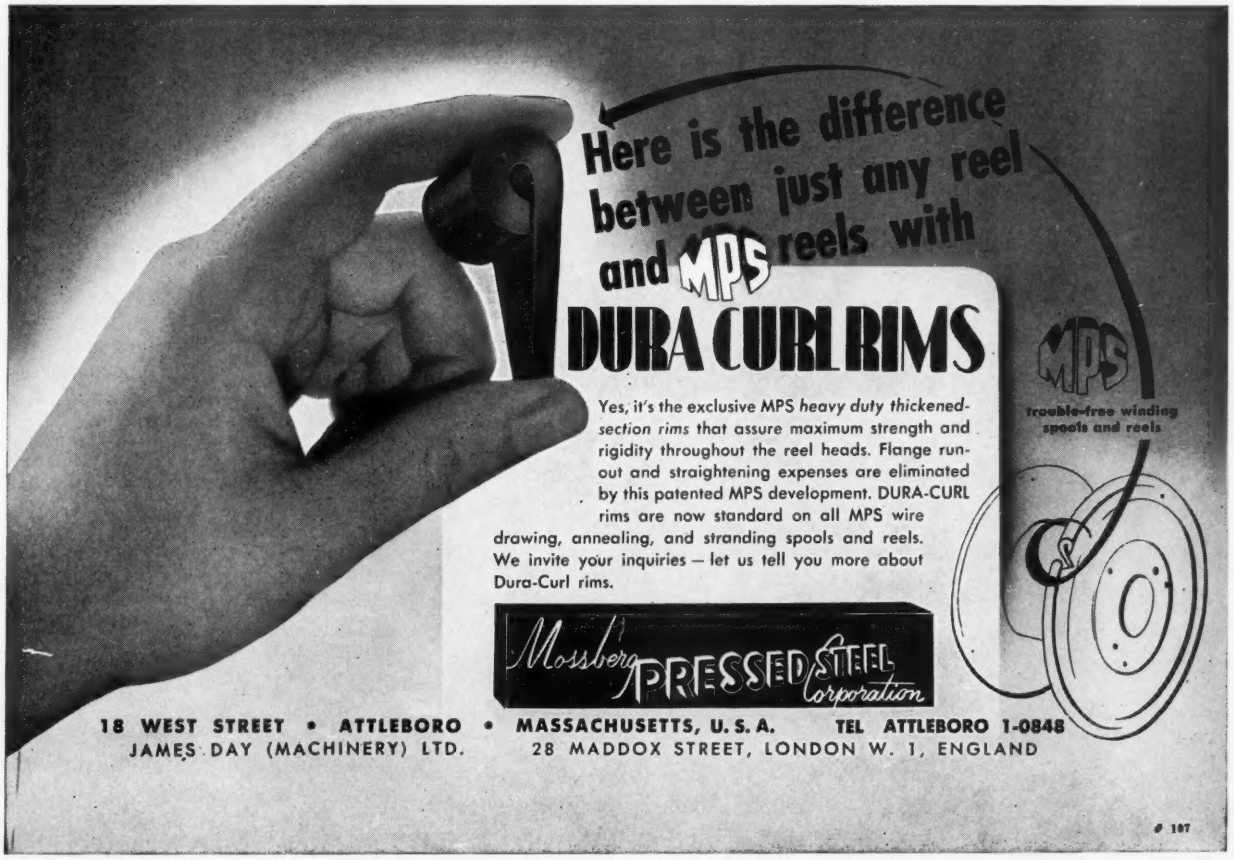
O. T. Thompson has been advanced to branch manager in the Detroit area. He started as a field representative in 1948, and since 1954 has served as assistant branch manager. He will continue under the supervision of **C. O. Ericke,** district manager.

★ ★ ★

J . C. Murray, former field representative, is now assistant branch manager in the Pittsburgh area, having been with the company since 1948.

★ ★ ★

Harry L. High, Jr., is now promoted to assistant branch manager of the Cincinnati area. He has been with Carpenter as a field representative since September 1953.


Here is the difference between just any reel and MPS reels with
DURA CURL RIMS
Yes, it's the exclusive MPS heavy duty thickened-section rims that assure maximum strength and rigidity throughout the reel heads. Flange run-out and straightening expenses are eliminated by this patented MPS development. DURA-CURL rims are now standard on all MPS wire drawing, annealing, and stranding spools and reels. We invite your inquiries — let us tell you more about Dura-Curl rims.
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New Staff, District Managers Named by Chase

The appointment of **Herman H. Kremer** as Staff Manager of Rod and Wire for the **Chase Brass & Copper Co.** was recently announced by **George B. Moseley,** Vice President in charge of sales. Mr. Kremer had been District Manager of the Chase sales office in Charlotte, North Carolina.

★ ★ ★

He graduated from Columbia University in 1945 with a B.A. degree. He also has studied business administration and took a specialized sales training course at the Chase Waterbury office early in 1954.

★ ★ ★

Starting his sales work with the company on August 13, 1945, he was stationed for one year at the Chase office in New York. There followed his appointment as a salesman in the Indianapolis district where he remained until becoming District Manager at Charlotte. He will make his headquarters in the main office in Waterbury.

★ ★ ★

Replacing Mr. Kremer as District Manager at the Charlotte sales branch will be **Thomas E. Cox,** previously a Chase salesman assigned to the St. Louis district.

★ ★ ★

Mr. Cox attended the University of Missouri and Washington University. He also took specialized sales training at the Chase headquarters in Waterbury about three years ago as well as previous training at the Cleveland, Ohio mill and plants of the **Kennecott Wire & Cable Co.,** a Chase affiliate in Phillipsdale, R. I.

Made Superintendent of Electrical Department

Irving M. Oppenheim has been named Superintendent of the Electrical Department by **Universal-Cyclops Steel Corp.,** at Bridgeville, Pa.

★ ★ ★

A graduate of the Carnegie Institute of Technology in Electrical Engineering, Mr. Oppenheim was formerly Assistant Chief Electrician at the Pittsburgh Works of Jones and Laughlin.

★ ★ ★

It was also announced that **Michael J. Shepos,** former Electrical Superintendent, will assume a newly created position as Staff Engineer, Electrical.

Kaiser Aluminum Appointments

H. S. Spaulding has been appointed general staff metallurgist, Fabrication Div., **Kaiser Aluminum & Chemical Corp.,** Oakland, Calif., and **J. A. Ketchum** named technical superintendent, rod, bar, wire and electrical conductor plant, Newark, O.

To Manage Branch Glass Fiber Sales

R. H. Barnard, Jr., Charlotte,

NORBIDE* Abrasive Grain...

Ready to cut Your Refinishing Costs!

Wire men who have switched from costly diamond dust to NORBIDE Abrasive for refinishing dies are amazed at the savings. They have found NORBIDE Abrasive — the hardest manufactured abrasive commercially available—ideal for ripping and semi-finishing operations. Whatever your requirements, we can supply you promptly from stock.

For details and prices on this cost-cutting abrasive, write for form 559, NORTON COMPANY, 45 New Bond St., Worcester 6, Mass.

NORTON®
BORON CARBIDE
Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories.
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*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

NORBIDE* | *The hardest manufactured abrasive commercially available!*

N. C., field representative for the **L.O.F. Glass Fibers Company,** has been promoted to District Manager of the Charlotte area, it was announced by **Clinton F. Hegg,** Vice President and General Sales Manager.

★ ★ ★

Prior to joining L.O.F., Mr. Barnard was with Glass Fibers Inc. for four years, first as an industrial engineer and later as Charlotte sales representative. A native of Toledo, he attended Colgate University.

To Represent Magnuson in Syracuse Area

Clifford Oates has been appointed by **Magnuson Products Corp.,** 50 Court St., Brooklyn 1, N. Y., to represent the company in Central New York State, working out of Syracuse, according to an announcement by **William F. Nickerson,** Sales Manager. Mr. Oates has been active in the metal finishing field and is a member of the American Electroplaters Society. He will sell "Permag" lubricants and other products made by the company.

Carpenter Steel Appoints Chief Metallurgist

George E. Brumbach has been appointed chief metallurgist of **The Carpenter Steel Company,** Reading, Pa. He has been a metallurgist at Carpenter since July 1951, and now occupies an office that was vacated in July 1954 by **Dr. Carl B. Post,** vice president and technical director.

★ ★ ★

Mr. Brumbach has extensive experience in steel mill metallurgical control and inspection. He has been associated with the Carpenter Metallurgical and Research Department since his graduation from Lehigh University in 1933.

Fastener Concern Appoints Purchasing Agent

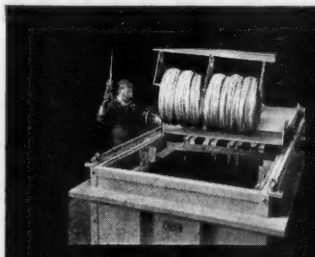
Charles R. C. Steers has been named purchasing agent for **Russell, Burdsall & Ward Bolt and Nut Company,** Port Chester, N. Y., according to an announcement by **William E. Ward,** president and general manager of the company.

★ ★ ★

Mr. Steers fills the position left open by the retirement of **P. M. Culyer,** who recently completed 45 years service with Russell, Burdsall & Ward. He joined the company in 1948 and has been assistant purchasing agent since April, 1952. Mr. Steers is a graduate of Yale University.

Firth Sterling Acquires Research Laboratory in Yonkers

The Yonkers research and laboratory facilities of the **Schwarzkopf Development Corp.,** formerly American Electro Metal Corp., have been acquired by **Firth Sterling Inc.** of Pittsburgh, Pa., it has been announced by **Kenneth D. Mann,** President of Firth Sterling Inc. and **Harry L. Osterweis,** Executive Vice President of Schwarzkopf Development Corp. These facilities



Far greater production in less space with lower cost equipment . . . for all steel and non-ferrous wire.

The fastest, most uniform way to heat treat wire* is often far lowest in cost!

AJAX
HULTGREN
electric SALT BATH furnaces

* Write for case history bulletins on Ajax Electric Salt Baths for.
- ■ Annealing ■ Patenting
- ■ Cleaning, Preheating
- ■ Descaling
- ■ Fluxing for Aluminizing

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ASSOCIATED COMPANIES:
AJAX ELECTRIC FURNACE CORP. • AJAX ELECTROTHERMIC CORP. • AJAX ENGINEERING CORP.

SEE US AT THE METAL SHOW—Booth 1609 (in the Arcade)

will be operated as the American Electro Metal Division, Firth Sterling Inc. At the same time a license agreement in the field of cemented tungsten carbides has been concluded between the two companies, who are also jointly interested in Borolite Corporation of Pittsburgh, a manufacturer of products for ultra-high-temperature applications.

★ ★ ★

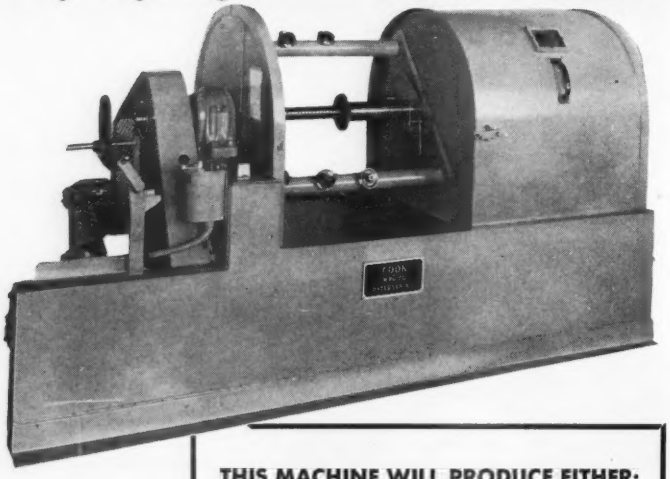
It is the company's intention, Mr. Mann stated, to maintain the Yonkers organization and facilities and expand them gradually. Various important research projects in which the laboratory is presently engaged for government agencies will be carried on.

★ ★ ★

Schwarzkopf Development Corp., through its subsidiaries and affiliated companies, will continue research projects in other fields.

A COOK BUNCHER — STRANDER

Your Answer to the New Military Specification: MIL-W-5086



takes less space

Models Available	Capacity
BH-8	45 lbs.
BH-12	90 lbs.
BH-16	200 lbs.
BH-22	500 lbs.
BH-24	1000 lbs.

Write today, for descriptive literature giving details of construction and performance

THIS MACHINE WILL PRODUCE EITHER:

Concentric Wire—Where layers are made up of wires in opposite direction of lay.

Semi-Concentric Wire—Where layers are made up of wires in same direction but with different lay to prevent strand locking.

- **HIGH SPEED**
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- **AUTOMATIC LAY CONTROL**
- **LARGE TAKE-UP REEL**

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CF&I Moves Philadelphia Warehouse

The Colorado Fuel and Iron Corporation has moved its Philadelphia district warehouse and sales office to new and larger headquarters at 225 West Erie Avenue, it was announced today by **H. C. Allington,** vice president in charge of sales, Eastern Division.

★ ★ ★

The most modern materials handling equipment, including the latest in lift trucks, pallets, racks and cranes, will speed up operations in the warehouse. The building has a ten car railroad siding and a loading platform that can accommodate 14 trucks.

★ ★ ★

In addition to housing the Philadelphia district sales office, the new warehouse will house CF&I's general warehouse department, the Philadelphia district warehouse, and the central warehouse for wire rope and hardware products.

Fenn Issues New Catalog on Swaging Equipment

The Fenn Manufacturing Company, Newington, Conn., a leading producer of metal-forming equipment, has published a new catalog on their complete line of swaging equipment. The catalog contains basic technical information about the rotary swaging process, its principles of operation and advantages as a precision production method; and explains many typical and unusual applications. Profusely illustrated, the catalog details some of the outstanding features of Fenn swaging machines, including specifications as to capacities, (which range from 5/32" to 3⅞" for solid stock, and from 7/16" to 6" for tubing), size, weight, power requirements, and die sizes. An accessory section displays the line of swaging machine accessories—manual feeds, air and hydraulic feeds, hopper feeds equipped with induction heating, quick-opening doors, coolant systems and the Fenn Hydroformer, used for special applications of assembling steel fittings to cable, or for central reductions.

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50¢ for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,752,956, WIRE FORMING ATTACHMENT FOR CUT-OFF MACHINE, patented July 3, 1956 by John C. Hampson, Detroit, Mich., assignor, by mesne assignments, to Rockwell Spring and Axle Company, Coraopolis, Pa., a corporation of Pennsylvania.

A pair of wire bending units are included, each having a wire shaping die and cooperating arbor to bend the wire. There is also a wire supporting magazine between the units and having a wire supporting floor to position the wire resting on the floor in alignment with the path of travel of the dies; this magazine being provided with upright side walls one of which terminates spaced above the floor a distance just exceeding the thickness of a wire adapted to be shaped by the dies; the upper face of the floor lying in the plane of the movement of the dies such that a wire disposed within the magazine and lying on the floor will be carried out of the magazine upon movement of the dies and against the arbor to shape the wire.

★ ★ ★

No. 2,752,958, WIRE JOINING MACHINE, patented July 3, 1956 by Richard Zippel, Hannover-Linden, Germany and Ernst Wenger, Binningen, Switzerland.

The machine is for tensioning and twisting together overlapped ends of wire applied to packages. The assembly includes a tensioner and a twister, with cams, cam discs, a twister actuator and a coupling device rotatable about the axis of the shaft of the machine.

★ ★ ★

No. 2,753,521, WIRE INSULATION TEST APPARATUS, patented July 3, 1956 by Michael Abrams, Ardsley, N. Y., assignor to Anaconda Wire and Cable Company, a corporation of Delaware.

Provision is made for a motor means for drawing the insulated wire through a sparker device, and operation of the motor means is permitted only when a good electric contact is established between two electrical connectors at the ends of the metal conductor of the insulated wire.

★ ★ ★

No. 2,754,024, NESTABLE WIRE BASKET, patented July 10, 1956 by Paul H. Planeta, East Hampton, Conn.; The Connecticut Bank & Trust Co., Hartford, Conn., executor of said Paul H. Planeta, deceased, assignor to Artistic Wire Products Company, Incorporated, East Hampton, Conn., a corporation of Connecticut.

A washed dish and silverware draining basket is provided formed of interconnected wires, including wires forming a special silverware holder.

★ ★ ★

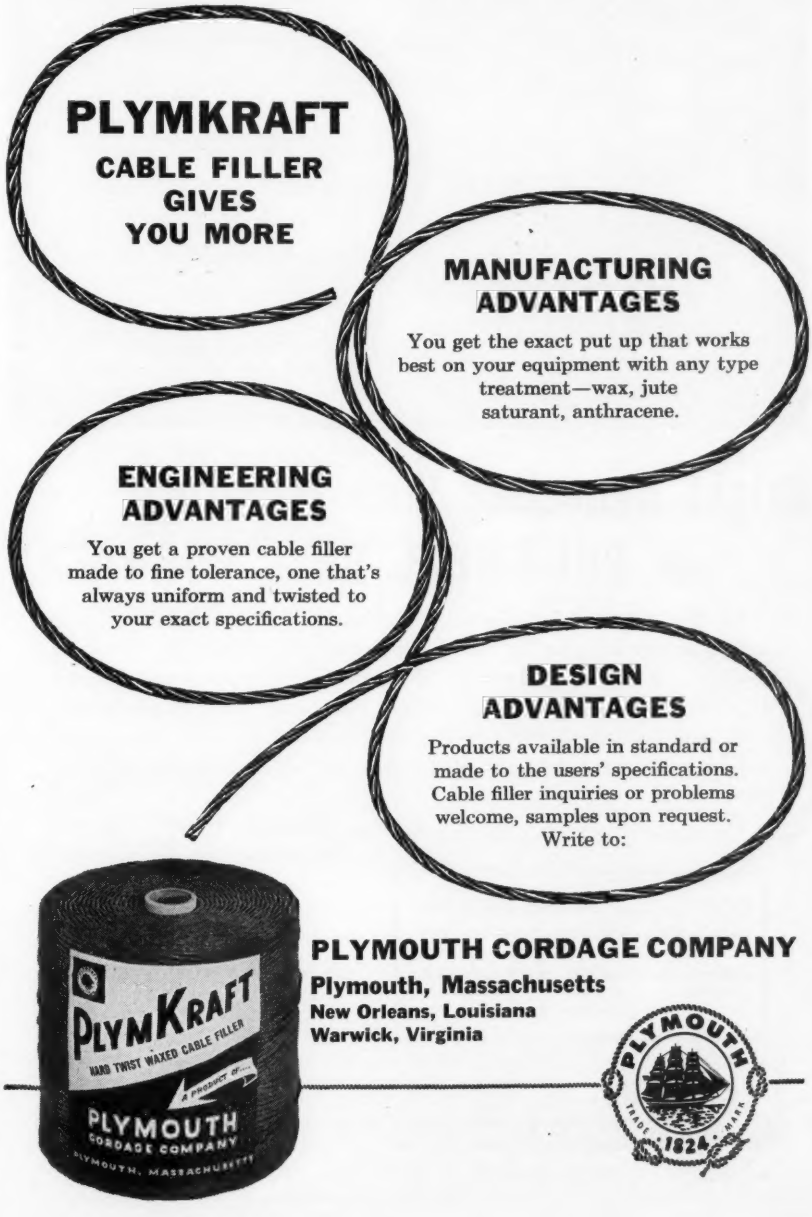
No. 2,754,351, SUBMARINE CABLE, patented July 10, 1956 by Heinz Horn, Koln-Mulheim, Germany, assignor to Felten & Guilleaume Carlswerk Aktiengesellschaft, Koln-Mulheim, Germany.

The cable is of the two stranded layers of armor type. The improvement consists in that each of the wires of the inner stranded layer has an internal torsional stress and each of the wires of the outer stranded layer has an internal torsional stress, the angular direction of all torsional stresses being the same with respect to the axis of the cable, so that it is said the cable may be coiled into the hold of a cable laying ship without difficulty.

★ ★ ★

No. 2,754,352, SHIELDED ELECTRIC POWER CABLE, patented July 10, 1956 by Amos Clarendon Connell, Hastings-on-Hudson, N. Y., assignor to Anaconda Wire and Cable Company, a corporation of Delaware.

A polyethylene insulated wire conductor is provided, with a cushioning layer of electrically conductive elastically resilient material surrounding the polyethylene insulation, and a thin inextensible metallic shield tape snugly



applied over the cushioning layer, whereby any substantial thermal expansion of the polyethylene that may occur during normal operation of the cable is accommodated by the elastic resilience of the cushioning layer without imposing an excessive tensile or hoop stress on the shield.

★ ★ ★

No. 2,754,353, COMPOSITE ELECTRICAL INSULATION AND METHOD OF FABRICATION, patented July 10, 1956 by William F. Gilliam, Schenectady, N. Y., assignor to General Electric Company, a corporation of New York.

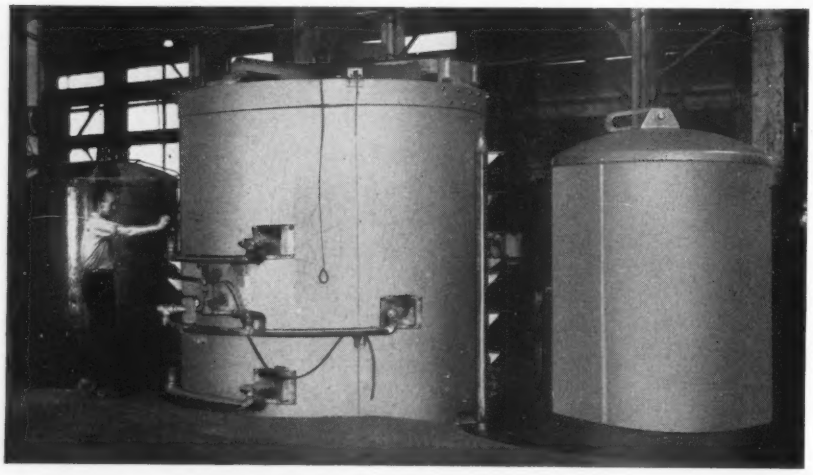
More specifically a magnet wire is disclosed comprising a copper conductor, a copper oxide layer on said conductor prepared by anodic oxidation of the conductor in aqueous alkaline solution, a layer of a modified silicone resin bonded to the oxide layer, the modified silicone resin comprising a mixture of a major portion of a hydrocarbon-substituted polysiloxane resin and a minor portion of an oil-phenol-aldehyde modified alkyd resin, and a layer of a phenol-aldehyde modified polyvinyl acetal resin bonded directly to the modified silicone resin layer.

★ ★ ★

No. 2,755,047, COMPACT WIRE FABRIC, patented July 17, 1956 by Heinz Henke, Duren, Rhineland, Germany.

What is provided is a wire filter fabric of close weave.

★ ★ ★



Bright Annealing Wire Uniformly in ROCKWELL BELL FURNACES

In this Rockwell installation four furnace bases and one gas fired, bell type furnace provide the required operating flexibility of heating, loading and unloading the work. Each base is equipped with a circulating fan to distribute heat uniformly to the charge.

A steel hood is placed over the work and sealed tight. The load of copper product is bright annealed in a protective atmosphere and cooled in the hood.

ROCKWELL ALSO BUILDS

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Rockwell bell furnaces (cylindrical or rectangular) are built to specifications for bright annealing steel and non-ferrous wire in coils or on spools.

Write for Bulletin 432 on Rockwell Wire Mill Furnaces.

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W. S. ROCKWELL COMPANY

FURNACES • OVENS • BURNERS • VALVES • SPECIAL MACHINERY

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Sales Representatives in Principal Cities

No. 2,755,079, ELASTIC METAL MESH TUBULAR BELLOWS, patented July 17, 1956, by Otto H. York, Maplewood, and Richard H. Westergaard, East Orange, N. J.

The bellows is of cylindrical tubular shape having corrugated walls, comprising a number of peripherally nested layers of woven flexible metal wire mesh fabric, these nested layers having been compressed into densitized form and corrugated at right angles to the axis of the tube.

★ ★ ★

No. 2,755,916, WIRE STORAGE AND REGULATING MEANS, patented July 24, 1956 by Edwin J. McIlvried, Medina, Charles P. Gardner, Randolph and Jess C. Bittman, Cuyahoga Falls, Ohio, assignors to The Vaughn Machinery Company, Cuyahoga Falls, Ohio, a corporation of Ohio.

This means is adapted to be positioned between two operating machines between which the wire is advanced. There are fourteen claims.

★ ★ ★

No. 2,755,917, STRAND ADVANCING APPARATUS, patented July 24, 1956 by Dan E. Koerner, East Troy, Wis., assignor, by mesne assignments, to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

A capstan is provided for advancing a number of wires at least a part of them being of magnetic material.

★ ★ ★

No. 2,755,977, WIRE HOLDER FOR FIBER MILK BOTTLES, patented July 24, 1956 by Donald W. Malcolm, Hollywood, Ill., assignor to Latex Laboratories, Inc., Chicago, Ill., a corporation of Illinois.

The holder comprises a length of wire bent to provide a bottom support, side supports and handle for the carton.

★ ★ ★

No. 2,756,394, DELAY CABLES, patented July 24, 1956 by Josef Sieven, Hannover-Kleefeld, and Ernst Scheffler, Hannover, Germany, assignors to Hackethal Draht und Kabel Werke A. G., Hannover, West Germany, a corporation of West Germany.

A delay cable is disclosed, comprising an inner conductor including a core element and a conductor wound on this element, an outer conductor, and dielectric means spacing the inner and outer conductors, the core element including an elongated, inextensible base member of dielectric material and a mixture of finely divided magnetizable material and a dielectric binder on the base member, the magnetizable material being uniformly distributed through the binder, the cable having uniform electrical characteristics along the length thereof.

★ ★ ★

No. 2,756,492, MANUFACTURE OF COMPOSITE DUCTILE WIRE, patented July 31, 1956 by Robert L. Pettibone, Detroit, Mich., assignor to Eaton Manufacturing Company, Cleveland, Ohio, a corporation of Ohio.

The method relates to the production of such wire for welding use to produce a hard facing.

★ ★ ★

No. 2,756,619, WIRE CUTTING AND

STRIPPING MACHINES, patented July 31, 1956 by Herbert D. Scharf, Brooklyn, N. Y.

This machine is adapted to cut and strip a portion of insulation from insulated wire from a supply carried by the machine.

★ ★ ★

No. 2,756,783, WIRE-TYING MACHINE, patented July 31, 1956 by Stanley P. Osuch, Cicero, Ill., assignor to United States Steel Corporation, a corporation of New Jersey.

This relates to a wire tying machine of the type having a wire twisting mechanism for producing a tie between overlapped portions of a wire looped around an object, and a wire cutting mechanism for cutting one of the overlapped wire portions at the end of the tie and the machine includes stationary and movable wire gripping mechanisms.

Kaiser to Expand Newark Wire, Rod and Bar Facilities

A $5½ million program to expand **Kaiser Aluminum & Chemical Corporation's** Newark, O., rod, bar, wire and electrical conductor works is now under way.

★ ★ ★

Under the program, capacity of the plant, largest producer of covered aluminum conductors in the United States, will be increased by approximately 23,500 tons of mill products annually.

★ ★ ★

The expansion will substantially increase the company's production of aluminum electrical conductor by enlarging wire drawing, stranding and insulating capacity to meet the steadily growing market for aluminum in the utility, electrical manufacturing and electronics industries. It will also expand capacity for aluminum alloy rod, bar and wire for mechanical uses.

★ ★ ★

Additions will cover new production equipment, alterations to existing equipment and a large new building to house warehouse, shipping and laboratory facilities.

★ ★ ★

New equipment to be purchased will include stranding machinery, wire drawing equipment, a flat wire rolling mill, insulating equipment, and increased testing facilities to insure quality control. First shipments of the new equipment are scheduled to arrive in September of this year.

Modification of the plant's 10-inch automatic rod mill—already one of the most modern of its type in the country—will substantially increase its capacity.

Bulletin on Teflon Hook-Up Wires

New Permacode extruded teflon hook-up wires are described in Bulletin No. 1901 published by **Revere Corporation of America,** Wallingford, Conn. Permacode wires, which now provide positive and permanent identification with the color extruded throughout the insulation, are available in fifteen solid colors or in striped combinations of 2, 3 or 4 of the solid colors. The bulletin includes constructions of various gage sizes built to meet requirements of Military Specification MIL-W-16878, types E and EE, and gives ordering information.

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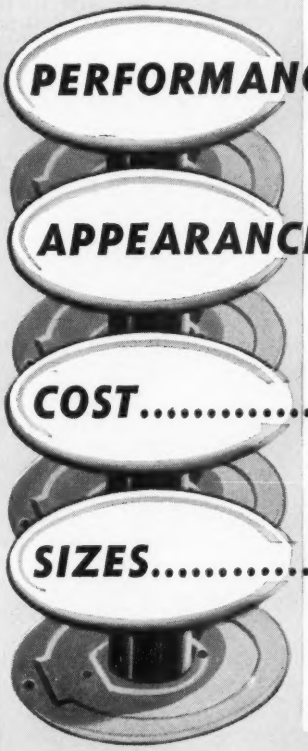

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MASON CAN COMPANY

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Branch Plant — Greenville, Ohio

New Design of Wire Insulating Head for Extruders

(*Continued from page* 1018)

The die holder is provided with a pair of regulator rods consisting of two of equal size penetrating its wall on the high pressure side and these two rods can be moved to and fro at the same rate by turning the centre bevel wheel which is engaged with the two bevel wheels on both sides, each of which is connected with each regulator rod of the pair, respectively.

★ ★ ★

The travel of the regulator rod adjusts the flows on the two sides equally, because the relative cross sectional area of the path is regulated.

★ ★ ★

In Fig. 5 horizontal line "H" and "L" each shows intensity of flow before regulation is started on the high and low pressure sides, respectively.

★ ★ ★

By the regulation, "H" will decrease and "L" will increase along each dotted line respectively till they intersect at point "M", then line "B" will be started from this point as a balanced intensity line.

★ ★ ★

The time required to finish regulation will be just a few seconds at most.

★ ★ ★

By the four frames the flow of material is constrained to pass right straight in the direction which is lengthwise of the guider tube; being divided into four and joining at the outlet of the frames, there occurs no spiral nor wrong flow at all.

★ ★ ★

To set the attachment, the operations should be carried on in the following order:

1. **Put the axis fitting cylinder in the die holder.**
2. **Fix the die holder with the axis fitting cylinder to the cross head so that the frame "10-10" be vertical.**
3. **Push the guider tube with tip into the cross head till its conical part fits perfectly into the inner conical surface of the axis fitting cylinder.**
4. **Put the die in the die holder.**
5. **Start extrusion and when a necessary condition of material—i.e. temperature, viscosity, intensity of flow etc.—is reached, and move the regulator rods steadily till the material flows out straight. This shows that the balance is completed.**

Conclusion

As the principle of the new design No. 1 is above mentioned, the new attachment may be used for any extruder for wire covering and also in the production of rubber tubing.

★ ★ ★

The essential feature is in its accurate and universal nature of balancing for almost any general use of a rubber or plastic extruder, and the ability to bring about a balance under a condition where axis of die is maintained always coincident with that of the tip.

★ ★ ★

No. 1 is thus an improved flow balancing system where the two

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Cabling machines for steel, copper and aluminum wires, rubber and telephone strands

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axes are coincident, in which the regulation is accomplished in the die holder.

★ ★ ★

No. 2 is more improved than No. 1, in which regulation is done in the cross head itself; this system will provide a fundamental solution to the unbalance that unavoidably originates from the basic construction of an extruder.

★ ★ ★

This will be described in another article before long.

Report on NEMA's Meeting of the Wire and Cable Section

(*Continued from page* 1016)

Peter P. Murawski, Elastomers Division, **E. I duPont de Nemours & Co.** (Chemical Progress) — "While history records that the chemical industry had an earlier start in Europe, it has been in these United States that it has made its greatest progress, especially as it is applied to the wire and cable business. This is due in part, at least, to the increased consumption of electric power in all classifications in this country and to the corresponding greater need for wire and cable by the ultimate consumer. And, this introduces extraordinary demands for higher operating temperatures and a variety of environments in which wire and cable has to perform—all of which act as incentives.

★ ★ ★

"Much of the credit for the application of the chemist's handiwork is due to the wire producer and the equipment manufacturer, both of whom translate, into insulations and coverings, the basic raw materials available to them. Were it not for their combined ingenuity these would gather dust on the laboratory shelf."

★ ★ ★

Harry L. Saums, Technical Director, **Anaconda Wire and Cable Co.** (NEMA Performance Standard for Magnet Wire)—Epoxy wire, a comparatively new type of magnet wire for high temperature applications, was discussed by Mr. Saums. This particular type of wire is enamel coated and rated as Class B. It is suitable for use at 130 Centigrade of continuous operating temperature. Mr. Saums stated that experience to date indicates that this insulation not only has high thermal insulation qualities, but that it is chemically compatible with most other insulations. Thus, he said, it can be used effectively as a part of an insulation system.

★ ★ ★

He reported that the NEMA Technical Subcommittee, of which he is chairman, is making considerable progress on the development of a performance standard for Class B enamel magnet wire. NEMA's plan is to issue a series of performance standards covering the various classes of magnet wire instead of the approach used so far of issuing a separate standard for each particular magnet wire insulation. Such a performance standard, he declared, would make it possible to evaluate the many new magnet wire insulations that are

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continuously coming on the market.

★ ★ ★

Howard H. Weber,, Sales Manager, Electrical Wire and Cable Dept., **U. S. Rubber Co.** (Performance Tests on Flexible Cords) — "Underwriters' Laboratories, Inc., for some time, has differentiated between the types of flexible cords used for portable lamps and radios and those used for other electrical appliances. This view, however, has undergone a change and the Laboratories, several months ago, agreed to study a suggestion that cord application requirements be based on performance tests. This would lead to recommendations that cords would be related to types of appliances for which they are applicable.

★ ★ ★

"**An** initial report has been issued and it is hoped that ultimately the Laboratories will conduct performance tests which will cover cord applications for all types of appliances, rather than for the three types now listed."

Committee Reports

The Section also heard reports presented by chairmen of two of it's key committees.

★ ★ ★

C. J. Blaker, The Okonite Company, and Chairman of the Wire and Cable Traffic Committee, reviewed the various traffic cases in which the industry has participated during the last two years. He stated that such participation has resulted in considerable savings in freight costs accruing to the industry. In emphasizing the importance of freight costs, he said that 4 to 5 cents out of each sales dollar for a typical wire and cable company goes for freight charges.

★ ★ ★

W. L. Grey, Personnel Administrator, **Anaconda Wire and Cable Company,** and Chairman of the Section's Industrial Relations Committee, reported that this new Committee has conducted an ambitious program during the past year. It has surveyed a number of industrial relations practices, and, through an information exchange activity, is attempting to continually improve such practices in the industry.

"Live Better Electrically" Project

Another feature of the Section's meeting was a presentation of the "Live Better Electrically" project by **Robert E. Boian,** manager of the project. Mr. Boian outlined the objectives of this long-range campaign to sell the basic advantages of electricity and electrical home equipment.

★ ★ ★

The project, he said, is spearheaded at the local level by over 200 utility companies. The residential-market drive is currently expanding to include electrical manufacturers and interested trade associations. He called the project "the first major program of its kind launched in the industry's 77-year history."

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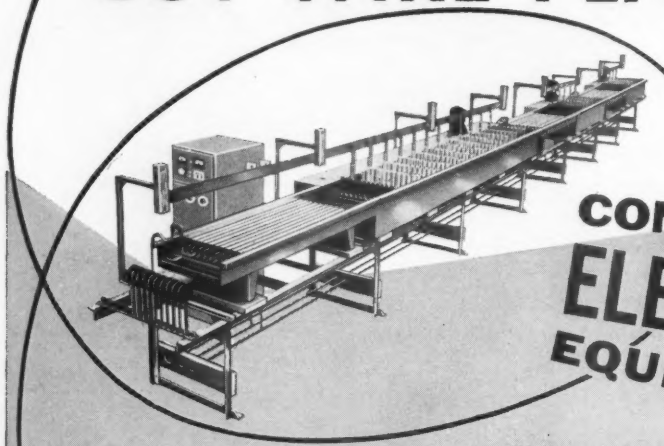

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Notes on Wire Activities In Other Countries

(*Continued from page* 1010)

importations from Italy, Germany, etc. In return Turkey will shortly come in with almonds, dried figs, etc. with which the Spanish harvests, hurt by the strong frosts of this year, will be well supplemented.

New Spanish Wire Mill

The new Spanish steel works of the Siderurgica Company in Avila, which will go into production by the end of this year, is now getting a wire mill with a capacity of about 40,000 tons per year. It is planned to start operations about the middle of 1959, because a wire rod mill must first be installed.

Recent German Estimate of Export Market for Wire Products

The export market for wire products is non-uniform. The previously noted weakening is worsening somewhat generally, without however approaching a buyers' market. Prices remain stable. The East-bloc delivers what it can at prices, with few exceptions, equivalent to West European quotations.

★ ★ ★

The South American business is in general somewhat better than was expected; at the same time the American competition is much reduced. It is interesting that the Chilean government import licenses for Spanish products includes grants in the wire division, although Spain is at this time not especially interested in making deliveries of this material.

★ ★ ★

African business is on the whole good, excepting in North Africa.

★ ★ ★

For the Spring and early summer of this year export sales are estimated to run under those of last year by about 5 to 10%, and in wire nails by 10 to 15%.

Fine Wire Aluminum Spools Announced

A new one piece aluminum spool is now being manufactured by **Alabama Wire Company.** This spool is developed for drawing and packaging fine wire—has all the advantages of a high price spool; however, it is priced very reasonably, and is more economical than spools of other metals.

★ ★ ★

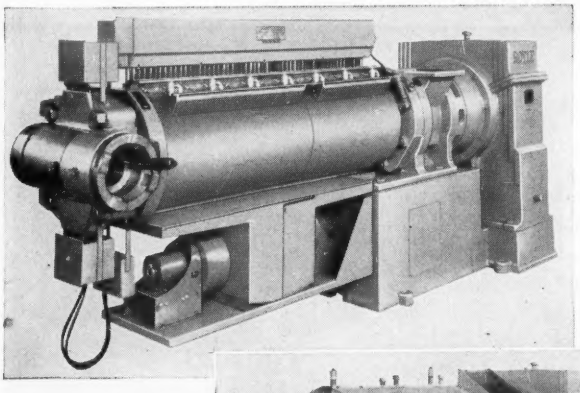
One piece construction eliminates any loosening, rattle, nonconcentricity, and saves money in handling and shipping.

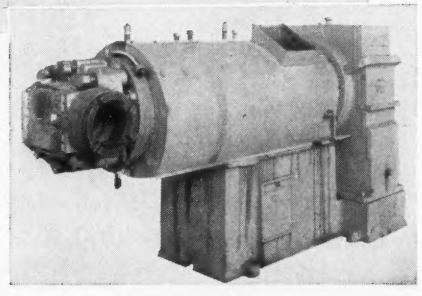
★ ★ ★

Delivery can be made with a company name and trademark attractively displayed in the metal on one end. The spool fits all fine wire drawing machines.

★ ★ ★

Please write Alabama Wire Co., Florence, Ala., for information on their "Alawire" spools.





8½" Spirod extruder with side delivery head for jacketing. Up-graded from circulating type shown to the right.

EVER THINK OF UP-GRADING TO SPIROD®?

Yes, it can be—and is being—done. And Royle's traditional approach to extruder development, the retention of features that have stood the test of time, makes it possible. The one-piece cylinder with built-in hopper is replaced by a separate cast steel hopper section, a cast steel cylinder with deep grooves that create fin-like separations for the rod type heating elements and the selective evaporative cooling equipment. Head and stock screw, as usual, are designed for process requirements.

If you are operating an older type Royle extruder you should investigate up-grading to Spirod—the electrically heated extruder with high velocity evaporative cooling—for maximum efficiency in controlled operating temperatures.

Write for Bulletin # 463

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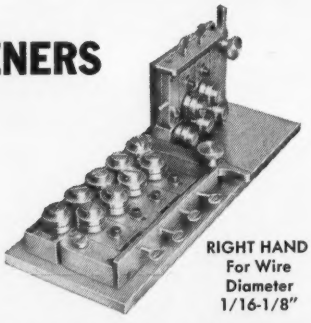
(Net Tons)

Covering Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or for Resale)

Steel Products	Items	CURRENT MONTH 1956 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	Prior Year (1955) Percent of Total Shipments	YEAR TO DATE 1956 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	Prior Year (1955) Percent of Total Shipments
Ingots and Steel Castings	1A	32,371	19,446	2,465	54,282	0.7	0.7	253,330	82,903	12,066	348,305	0.9	0.7
Blooms, slabs, billets, sheet bars	1B	149,978	51,423	3,357	204,758	2.6	3.2	821,858	267,386	14,078	1,103,322	2.8	3.3
Tube rounds	1C	948	338	7	1,293	-	-	1,680	1,272	67	3,019	-	-
Skelp	2	19,638	-	-	19,638	0.3	0.2	81,776	-	-	81,776	0.2	0.2
Wire rods	3	110,906	2,006	461	113,373	1.5	1.3	506,830	11,153	2,182	520,165	1.3	1.4
Total Semi-Finished	---	313,841	73,213	6,290	393,344	5.1	5.4	1,665,480	362,714	28,393	2,056,587	5.2	5.6
Bars—Hot rolled (incl. light shapes)	14	672,436	174,721	5,973	853,130	11.0	10.3	* 3,196,557	933,835	26,527	* 4,156,919	10.7	10.3
Bars—Reinforcing	15	230,250	-	-	230,250	3.0	2.9	1,032,093	-	-	1,032,093	2.7	2.4
Bars—Cold finished	16	139,293	26,226	5,583	171,102	2.2	2.1	696,222	142,247	26,843	865,312	2.2	2.2
Tool steel	17	1,702	11,028	-	12,730	0.1	0.1	8,043	49,503	-	57,546	0.1	0.1
Total Bars and Tool Steel	---	1,043,681	211,975	11,556	1,267,212	16.3	15.4	* 4,932,915	1,125,585	53,370	* 6,111,870	15.7	15.0
Wire—Drawn	23	294,265	5,143	3,003	302,411	3.9	4.0	1,375,815	24,130	15,043	1,414,988	3.6	3.8
Wire—Nails & staples	24	55,574	-	1	55,575	0.7	0.8	259,610	-	1	259,611	0.7	0.8
Wire—Barbed & twisted	25	8,319	-	-	8,319	0.1	0.2	45,127	-	1	45,128	0.1	0.2
Wire—Woven wire fence	26	32,852	-	-	32,852	0.4	0.4	150,082	-	-	150,082	0.4	0.5
Wire—Bale ties	27	8,991	-	-	8,991	0.1	0.1	26,187	-	-	26,187	0.1	0.1
Total Wire & Wire Products	---	400,001	5,143	3,004	408,148	5.2	5.5	1,856,821	24,130	15,045	1,895,996	4.9	5.4
Sheets—Hot rolled	31	758,367	33,295	2,543	794,205	10.2	10.8	3,876,223	201,996	10,675	4,088,894	10.5	11.4
Sheets—Cold rolled	32	1,247,487	5,587	14,531	1,267,605	16.3	17.3	6,268,209	31,360	67,152	6,366,721	16.4	18.3
Sheets—Galvanized	33	272,741	-	-	272,741	3.5	3.1	1,373,123	-	-	1,373,123	3.5	3.3
Sheets—All other coated	34	22,846	-	-	22,846	0.3	0.3	113,984	-	-	113,984	0.3	0.3
Sheets—Enameling	35	NOT AVAILABLE. INCLUDED IN COLD ROLLED SHEETS											
Electrical sheets & strip	36	11,354	63,662	-	75,016	1.0	0.9	57,956	317,423	-	375,379	1.0	0.9
Strip—Hot rolled	37	160,899	4,243	207	165,349	2.1	2.5	833,551	16,937	1,547	852,035	2.2	2.5
Strip—Cold rolled	38	123,262	1,618	16,808	141,688	1.8	2.0	660,981	8,067	96,515	765,563	2.0	2.1
Total Sheets and Strip	---	2,596,956	108,405	34,089	2,739,450	35.2	36.9	13,184,027	575,783	175,889	13,935,699	35.9	38.8
Total Shipments (1956)	---	7,182,815	521,059	60,902	7,764,776	100.0	xxx	35,850,091	2,708,223	297,667	38,855,981	100.0	xxx
Total — Prior Year (1955)	---	7,000,034	482,426	58,429	7,540,889	xxx	100.0	31,755,597	2,192,766	271,583	34,219,946	xxx	100.0

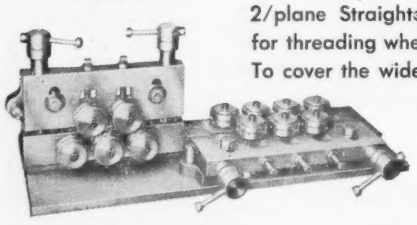
Sjogren 2 PLANE ROLL STRAIGHTENERS



RIGHT HAND
For Wire
Diameter
1/16-1/8"

Sjogren Two Plane Roll Straighteners are fully ball bearing for heavy production duty. They are designed to accommodate all sizes and grades of round or shaped wire whether it be high carbon, low carbon or copper, as well as the many alloys, from .010" to .375". Once set for the job at hand Sjogren 2/plane Straighteners may be opened and closed for threading when making coil changes without effecting the adjustment of the setting. To cover the wide range of wire diameters there are several size groups manufactured with either left or right hand direction. Each is individually produced to exact specifications for the grade, size and type of wire to be processed. Sjogren Two Plane Roll Straighteners do their duty each day, every day in the year.

LEFT HAND
For Wire Diameter
3/16-3/8"



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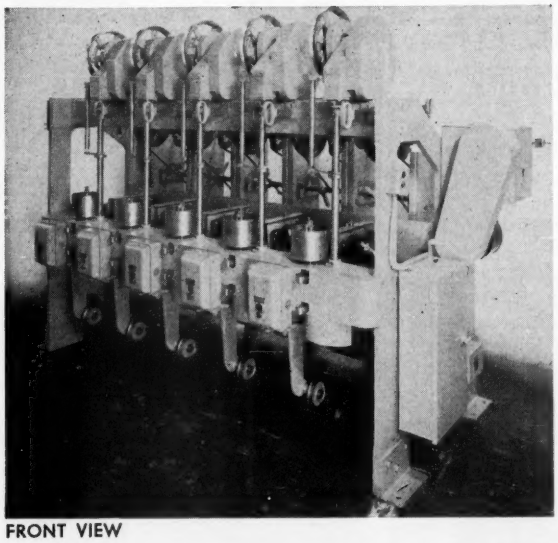
SJOGREN TOOL AND MACHINE CO., INC.
Tools for The Wire Industries
14 SWORD STREET, AUBURN, MASSACHUSETTS

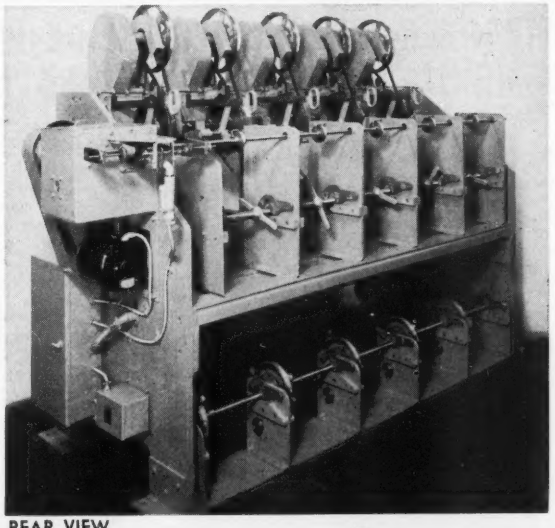
NON-FERROUS METAL STATISTICS

Refined metals consumed in mill products 1/ in 1955 (preliminary) and in 1956, by months, and stocks of refined copper at end of period, gross weight in short tons

Period	Consumption						Stocks of refined Copper	
	Wire mills	Brass mills						
	Refined copper 2/	Refined copper 2/	Refined lead	Primary pig tin	Refined nickel	Slab zinc	Wire mills	Brass mills
1955	824,609	646,156	3,443	1,055	3,527	133,737	21,387	40,580
1956:								
January	77,293	65,519	300	135	368	12,203	18,102	33,173
February	71,838	63,703	345	138	411	11,680	18,900	34,268
March	82,678	60,542	329	128	368	11,884	17,875	40,272
April	81,871	60,035	291	112	366	11,800	20,737	42,233
May	82,270	58,625	246	95	342	11,381	23,586	45,274
June	79,013	44,110	177	(3)	(3)	7,475	28,480	51,566

1/ Data cover operations of 17 wire mills and 57 brass mills.
2/ Detailed information on consumption of refined copper is published in the Monthly Copper Report.
3/ Not available.


FRONT VIEW


REAR VIEW

#2S-5-MBB INSULATION WINDING MACHINE

APPLIES SINGLE COVER TO 5 LINES OF WIRE SIMULTANEOUSLY. NOMINAL WIRE RANGE #15 TO #25 B & S GAUGES (.057" TO .018" OR 1.450 TO .455MM). STANDARD CAPSTANS 8" DIAMETER, BUT MACHINE ILLUSTRATED IS SPECIALLY ARRANGED WITH 12" DIAMETER CAPSTANS, IN PLACE OF STANDARD 8", FOR HEAVIER WIRES. SUPPLY WIRE LET-OFFS AND TAKE-UPS ARE AT REAR OF MACHINE.

EST. 1855 AIMco INC. 1915
"American" AIMco INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.
FAIRHILL AND HUNTINGDON STREETS
PHILADELPHIA 33 PENNSYLVANIA U.S.A.

Announcing a New Line of

WIRE DRAWING COMPOUNDS

for

STEEL, COPPER, BRASS, ALUMINUM, ETC.

These new compounds for both WET AND DRY WIRE DRAWING have been under development and field test for 2 years and are showing superior results in leading wire mills, with savings in wire production—and in *original* cost.

Write or telephone for full information

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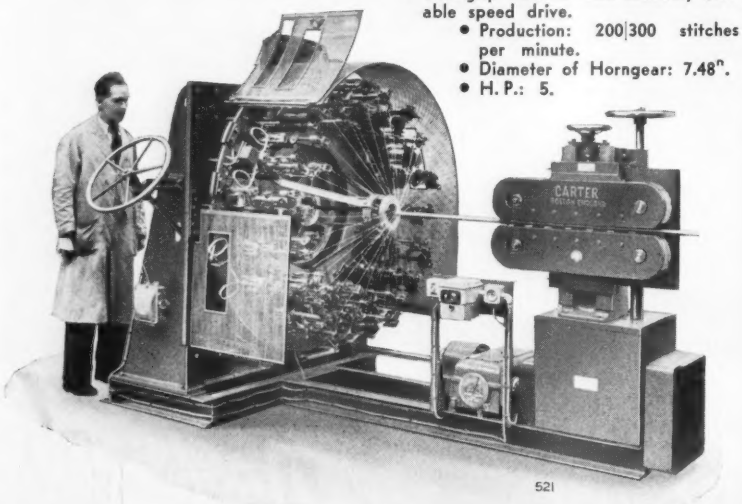
IMPROVED, HIGH SPEED, SLIDE PLATE TYPE, HORIZONTAL WIRE BRAIDING MACHINE

HAVING 36 "MAX" WIRE CARRIERS FOR 3¾" DIA X 2" TRAVERSE BOBBINS.

- Twin-grip haul-off with infinitely variable speed drive.
- Production: 200|300 stitches per minute.
- Diameter of Horngear: 7.48".
- H. P.: 5.



This machine also arranged with 2 speed electric motor drive for operation with Carters Yarn "Speedway" Carriers for package 6" traverse by 3" diameter.

B. & F. CARTER & CO., LTD. BOLTON, ENGLAND

TELEGRAMS: "BRAIDERS BOLTON"

MAKERS OF PLANT FOR ELECTRIC CABLE, BRAIDING & WIRE ROPE

·PRIMARY ALUMINUM PRODUCTION
IN THE UNITED STATES
(in pounds)

1956	
June	291,452,517
May	301,600,064
Total for year through June	1,720,607,779
1955	
June	255,265,003
Total for year through June	1,519,733,010
All-time record month	
May 1956	301,600,064
All-time record quarter	
2nd 1956	882,505,193

ALUMINUM STATISTICS

Automatic Forming of Wire Products

(*Continued from page* 1009)

are also required to suit the wire diameter, feed length and type of material being used for the particular sample. The sequence of operations is: 1) entry of the wire into the straightener rolls; 2) feeding the stock into the machine; 3) clamping or gripping the wire, simultaneously cutting it to the desired length; 4) as soon as the wire is cut the first slide is advanced by a cam to form the back of the object; 5) slide numbers two and three then close in from the sides to mold the wire to the shape of the die; 6) slide number four is then actuated to give the product its final shape; 7) slide numbers one, two and three meanwhile have held their positions until number four has performed its operation, all then simultaneously being withdrawn; and 8) a stripper slide comes down from above to eject the work into a receptacle. These operations are shown in the plan drawing, Figure 3.

★ ★ ★

For special jobs requiring verti-

PLANDEX "Hi-Quality"
Plastics Reworking Service
Turns Your Waste into Profit!

BLEEDER STOCK
CABLE STRIPPINGS
AND CUTTINGS—
Reprocessed
To Original
Extrudability

Thermoplastics
Restored
FOR REUSE IN
JACKETINGS AND
INSULATIONS

VIRGIN
MATERIALS
Compounded to
Your Recipe!

Turn your waste into valuable by-products the Plandex controlled quality way. Every job benefits from thorough experience, modern customized equipment including dual worm compounder-extruders and careful accurate interpretation of your specific requirements. We serve the industry's leaders throughout the U.S. and Canada.

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cal plane forming, other slides may be added to the basic machine and special attachments are available for pointing, or other special operations. Machines often are furnished with tools made to conform to a customer's sample, although many large wire product manufacturers purchase the equipment without them, preferring to do their own tooling for their special circumstances.

* * *

Machines come in a variety of sizes built to handle wire diameters from 1/32 of an inch turning out 360 wire forms per minute to those made for 1/2 inch wire at 50 objects per minute.

* * *

An interesting feature of some of these machines is a split cam construction, by which cams may be changed readily for special operations of a more complex nature. This arrangement, by merely removing a few screws, permits the change of a cam of one shape to that of another in a few minutes, considerably adding to the versatility and efficiency of the machine.

* * *

The mechanisms of the four-slide machine are constructed of the finest materials finished to the most exacting tolerances. The adjustment of the relationship of one part to another is a critical operation, but once assembled, run-in and tested, the machines go out to a customer for long periods of trouble-free, high production runs.

* * *

This is not to imply that no maintenance is required, for like any fine piece of machinery, the four slide must be kept clean and well lubricated. But given the necessary care, it will perform with uncanny precision and regularity with little or no other attention. This work can be minimized by use of automatic lubrication systems that eliminates much of the human element — often the occasion for unnecessary wear and tear.

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BUYERS' GUIDE
AVAILABLE FOR $5.00 EACH

Here's why you should coat high and low carbon steel rod with

BORAX 5 MOL.

WON'T RUST
WON'T FLAKE
PENETRATES SURFACE
THICK COATING

No Dust... For a cleaner shop—pleasant working conditions and easier house keeping. Borax-coated rod does not dust or flake, can be held in storage longer and is pleasanter to handle.

No Baking... The Borax solution penetrates the porous surface of the metal, neutralizing deepseated acid, and eliminating the need for baking.

Longer Storage... The continuous film of Borax inhibits the formation of rust for a considerable period—particularly important where several days may elapse between coating and drawing.

Economical... A single dip in the Borax bath provides a thick durable coating which is very valuable where the wire is to be drawn in several stages.

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For the past ten years we have specialized in the compounding of Vinyl extrusion and injection molding compounds to specifications, or developing compounds for a specific use.

Underwriters' approved standard compounds are available in all colors for POT, T, TW, 80 Degree C, 90 Degree C and 105 Degree C wires. We also have a compound which will meet requirements of Military Specifications MIL-W-5086.

If you require a Vinyl compound rated higher than 105 degrees C for special applications, we suggest you communicate with us, as we may have a compound to meet your requirements.

Your inquiries are invited.

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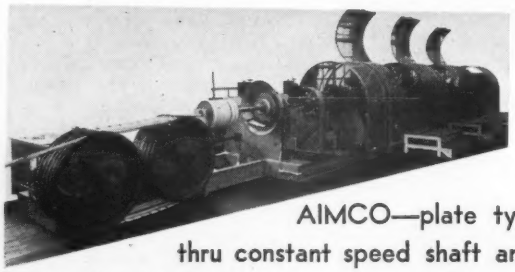
4-WIRE TWISTING MACHINES



CABLE REELS 48" DIA.-31" O. A. WIDTH.

FILLERHEAD 24 PACKAGES 12" DIA., 12" TRAVERSE.

AIMCO—plate type serving head driven thru constant speed shaft and variable speed drive. Taping head 24" pad driven thru constant speed shaft and variable speed drive.

Capstans double 6 groove 42" root diameter. Rates of lay from 3" to 50". Flyer speed 8 steps from 600 to 34 R.P.M. Handles large diameter wires on cradle reels.

An exceedingly efficient and versatile machine.

THE EDMANDS CO. 860 WELLINGTON AVE., CRANSTON 10, R. I.

Folder on Polyethylene Processing Tips

A handy file folder of U.S.I. Polyethylene Processing Tips has been prepared by the **U. S. Industrial Chemicals Division of National Distillers Products Corp.,** 99 Park Avenue, New York 16, N. Y., and is available upon request.

★ ★ ★

According to **Vincent McCarthy,** Manager, Polyethylene Sales, the folder was designed for reference files to answer the questions:

1. **What operating conditions give best results with the various types of polyethylene resins on the market?**
2. **What types of polyethylene resins are available from U.S.I. and what properties do they have?**
3. **What services does U.S.I. offer the polyethylene processor?**

★ ★ ★

U.S.I. manufactures Petrothene® Polyethylene Resins in a number of series for every use from pipe, blow molding and film to electrical grades. Included in the folder are Processing Tips covering increased production rates, tailor-made resins, reduction of warpage in injection molding, and choice of the right resin for polyethylene wire coating.

★ ★ ★

Future issues of U.S.I. Polyethylene Processing Tips will be prepared to keep the folders up to date.

The Manufacture of Standard Nuts

(*Continued from page* 1007)

showing the grain structure of such a cold-formed nut.

★ ★ ★

Fig. 4. is a photograph of the Hatebur PKE 16 pre-forming nut press having a capacity up to 5/8" nuts, and Fig. 5. shows the PKZ 1½ which is the corresponding finishing press of the same capacity, each machine being powered by a 12 h.p. motor, the weights being 17 tons and 9½ tons respectively. The output from the combined installation is 30,000 nuts (finished except for tapping and packing) per 8-hour shift.

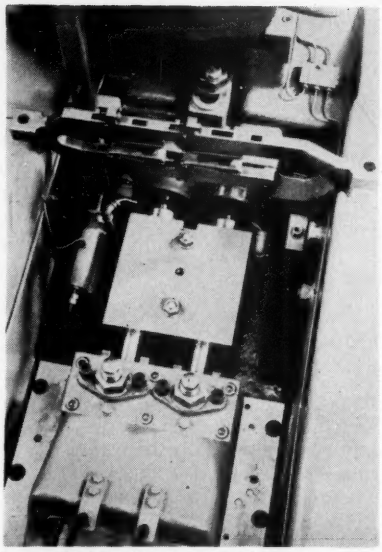


Fig. 6—Tooling layout on finishing press (with transfer slide dismounted).

Fig. 6. shows the tooling lay-out of a finishing press (with the transfer slide dismounted), from which it will be seen that the design of the tools is based upon what is traditional in the industry. In this cold-forming process tools of ordinary tool steel have a normal life of some 150,000 pieces, but with carbide-tipped dies the life is increased to over 2 million pieces.

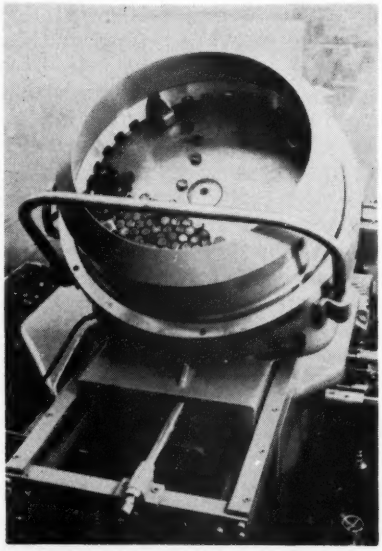


Fig. 7—Hopper for automatically feeding finishing press.

Fig. 7. shows the hopper which positions and directs the blanks into the feed chute of the finishing press.

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ALUMINUM • ALLOY WIRES

SPECIALIZED EXPERIENCE
TWISTING • STRANDING
BUNCHING
CONTINUOUS TENSION CONTROL
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WRITING TECHNICAL ARTICLES

AN INVITATION

YOU get a lot of good out of the articles that appear in WIRE AND WIRE PRODUCTS and we'd like to ask YOU, as one of those who has not written for us, to share your knowledge with others in 1957 in this manner. Everyone has some good material.

We shall be glad to pay for articles—or you can contribute them for the benefit of the industry. Paid articles are not eligible for awards, but all others written by members of THE WIRE ASSOCIATION are. The industry needs your help.

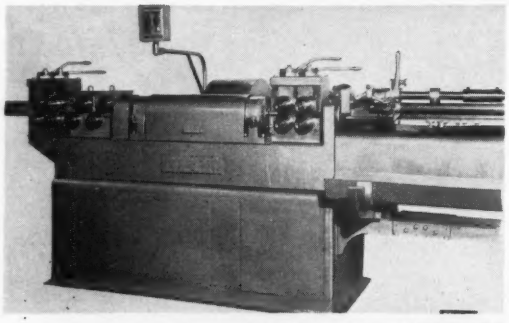
If you have any ideas on subjects you think would be of interest, won't you please write to us. We're interested.

WIRE AND WIRE PRODUCTS

453 Main Street • Stamford, Conn.

New, Fast STRAIGHTENER and CUTTER

Handles 1/4" to 1/2" Wire—3" to 50' Lengths



Model 9A, pictured, is for ferrous or non-ferrous heavy wires. Other models accommodate smaller stock.

The 9A feed and speed can be varied from 70 to 200 feet per minute.

OTHER FEATURES

Wichita low-inertia air tube clutch and air brake makes quick, clean and positive cut-off possible. Electric actuated trip. Motor control switch on swinging pendant. Tool storage in base. Bundling brackets. End pull-through device. Two 4-roll feed housings for positive feeding. Many other refinements—all features of the 9A and other models for finer wires.

ALSO MANUFACTURERS OF WIRE REELS AND HI-HATS.

Send your requirements and ask for details.

The Geo. C. PATTERSON MACHINE Company

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A Request to the Wire Industry

We are now correcting listings for the

1957 WIRE & WIRE PRODUCTS BUYERS' GUIDE

All manufacturers of rod, bar, wire and equipment or supplies should be correctly listed for the guidance of your customers.

Will you help us by checking your present listings and giving us any corrections, additions or deletions that should be made?

This is as important to you as to us. Please write

Editor

WIRE AND WIRE PRODUCTS

453 MAIN STREET

STAMFORD • CONN.

IPCEA Activities

(*Continued from page* 1005)

per, VC, rubber and thermoplastic insulated power and control cables. It recently expanded its efforts into 2 new Sections, one dealing with Overhead Transmission Conductors and the other dealing with Communication Cables.

★ ★ ★

The Overhead Section will concern itself with items including:

Sag-tension and related problems
Conductor application data
Current-carrying capacities
Conductor designs
Reels

★ ★ ★

The Communication Cables Section will consider

Supervisory Control cables
Telemetering cables
Police Signal cables
Fire Alarm cables
Dispatch and patrol cables
Telephone cables, shielded and non-shielded, paired and quadded for voice and carrier frequencies
Intercommunication cables, both shielded and non-shielded.

★ ★ ★

Nor will IPCEA's concern with high-frequency be confined to communication cables alone because there already are indications of economies to be effected through the use of frequencies higher than 60 cycles in the power field. This is not only true for shipboard but also for standard commercial applications. One of the latest lighting installations was carried out with 800 cycles because of these economies. I am sure that all of you present know that some a-c phenomena at 800 cycles are radically different than at 60 cycles. Who will ultimately supply that information to the electrical industry? The NEMA-IPCEA team, of course.

★ ★ ★

Mother Earth has been very good to us and yet we have failed to solve many of the mysteries locked within her interior. One of these, of paramount importance to our field, is the ability of the soil to dissipate the heat created by cables buried directly in the soil or installed in underground ducts. Statistics seem to indicate that the

failure rate is higher for cables in under-ground ducts than for cables buried directly in the soil. We must therefore have a more intimate knowledge of the thermal resistivity of the soil in order to better rate the vast quantities and varieties of cable installed by either method in the soil. It would be comparatively simple if the value were a constant for every portion of the U.S. and did not vary with the Seasons. Unfortunately, this is not so nor do present seasonal power peaks correspond to those we were accustomed to in the past. Our problems and financial obligations will be tied in very intimately with a more detailed knowledge of soil resistivity. It is for that reason that IPCEA is cooperating with others in an investigation leading to the determination of soil resistivity.

★ ★ ★

As regards permissible operating temperatures of new insulations for general use in the home and in industry, there must be a point of no return when the use of higher temperatures may be feasible for the insulating materials but dangerous or offering potential fire hazards to the surrounding materials. The sober judgment of IPCEA is the only available industry medium through which to arrive at proper temperature limits for such newer materials.

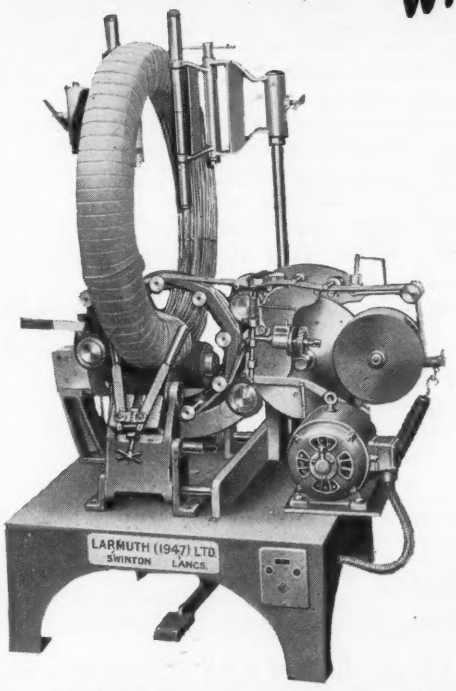
★ ★ ★

The foregoing is an attempt to take periodic inventory of our present endeavors and the reason for the Projects currently being considered by IPCEA. Time does not permit of covering such numerous items as protective coverings over metallic sheaths, aerial cables, self-supporting service drop cables, mining machine cables, polyethylene for power cables over 5 Kv, high-voltage rubber cables for voltages up to 45 Kv, new types of building wires that will eliminate all of the present types culminating in one type for all conditions wet or dry and up to 75C or even 85C.

★ ★ ★

I do however wish to stress a few of the more important pro-

LARMUTH *Spiral Wrapping* MACHINES



are built to finest British engineering standards and are in use throughout the world for spiral wrapping of Motor Tyres, coils of Wire, Strip, etc., from 3" bore upwards. Also straight length Tubes, Bars, Rods, etc.

"BOUND" to get there safely.

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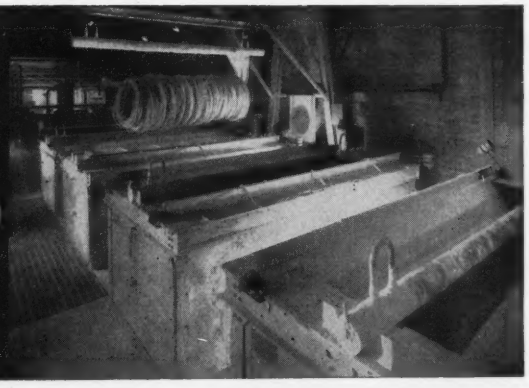
ROD BAKERS



Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

Here are just a few of our many satisfied customers:

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2,235,559
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OTHER PRODUCTS: Core Ovens • Mold Ovens • Welding Rod Ovens • Heat Treating Ovens & Furnaces • Special Processing Equipment and Accessories.

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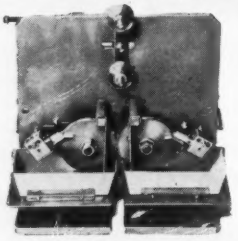

Gillies Engraved Concave Wheels are widely used for printing on rubber or plastic coated wire, for code or manufacturer identification. Machines print on ONE or BOTH SIDES in large legible letters. Wheels adaptable to any machine or we will supply machines. Wheels, shafts, ink pans and all accessories readily removable for quick and easy cleaning. Wheels made of hardened tool steel.

Send for samples of wire and prices on wheels and equipment

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211 sizes Bright Polished, .0015" to .3437"
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Wires Straightened and Cut to length—Small Gauges—Small orders our specialty
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jects occupying IPCEA attention at present:

Revision of present standards for rubber and rubber-like insulated wires and cables. This is a much needed revision which may possibly be completed early in 1957.

Specifications for Pre-Assembled Aerial Cables for voltages up to 15 Kv, prepared in consultation with EEI. Discussions are now under way as to the best means of publishing this standard.

Specifications for Nonmetallic Protective Coverings for Lead Sheathed Cable. This may be completed early in 1957.

Current-Carrying Capacity of Insulated Aluminum Conductors. This project, a counterpart of the one already available for insulated copper conductors, will require some additional deliberations but may possibly be completed during early 1957.

Short Circuit Characteristics of Cables. This is a very important project especially with the tremendous quantities of power available during fault conditions. This should be available for possible publication early in 1957.

Specifications for Metallic Coverings. This has just been completed, and copies are currently being studied by AEIC and ASA. It is however in condition where, if deemed necessary, it may be published as a joint NEMA-IPCEA Standard.

Standard for Aluminum Arc Welding Cable.

Equivalency of D-C and A-C Testing.

Establishing a Standard for all types of Nonmetallic Jacket Thicknesses for All Types of Cores, as a result of technical investigations.

Current-Carrying Capacity of Neutral-Supported Secondary and Service Drop Cables. This should be available for possible publication before the end of 1956.

Specifications for Polyethylene Sheaths over Insulated Conductors.

General Specifications for Wire and Cable with Thermoplastic Insulations. This is the first attempt to develop a separate set of specifications for these products. It may be ready for printing sometime in 1957.

Pulling Tensions for Lead Covered Cables.

Sixth Edition of IPCEA Specifications for VC Cable. This should be ready for submittal to NEMA by the end of 1956.

Specifications for VC Interlocked Armored Cables.

Method of Calculation of Current-Carrying Capacity of Buried Cables and Cables in Ducts. I have reserved this Project for mention last, because it will be one of the most important on our agenda. The work is monumental and may require financial assistance from others in the electrical

industry who will make use of the results. The basic labor is one of a tremendous number of engineering calculations.

★ ★ ★

In conclusion, and as President of IPCEA, may I express the sincere appreciation of our Members for the splendid cooperation and understanding existing between our respective organizations.

Steel Pail Solves Problems In Magnet Wire Industry

A steel pail has solved three of the most troublesome problems of the magnet wire industry—packaging, shipping and de-reeling.

★ ★ ★

The enthusiastic reception of this new wire container by electrical manufacturers is an indication of its further application as a package for wires of all types—brass, aluminum, stainless steel, alloys, welding and soldering wires.

★ ★ ★

According to **C. K. Hubbard,** General Manager of **Jones & Laughlin Steel Corporation's** Container Division, the use of the steel pail as a wire container results in manufacturing economies, simplifies material handling, eliminates bookkeeping and makes a package that provides superior protection against transit and storage damage for the wire itself.

★ ★ ★

The steel pail, developed cooperatively by Jones & Laughlin and the **Rea Magnet Wire Company, Inc.,** Fort Wayne, Ind., is being used with outstanding success by Rea in packaging magnet wire. It is non-returnable.

Revised Bulletin on Acrylic Resin Wire Enamel

A third revision of a technical bulletin on "Lecton" acrylic resin wire enamel is now available from the **Du Pont Industrial Finishes Division.**

★ ★ ★

The 12-page bulletin describes the new magnet wire enamel in comparison with standard wire enamels — polyvinyl formal and nylon.

★ ★ ★

"Lecton" is substantially superior to polyvinyl formal in heat aging characteristics and may be considered a candidate for Class B (130°C.) insulation. It is also superior to nylon in many important properties and is lower in cost.

★ ★ ★

Sections of the bulletin, profusely illustrated with photos and tables, are devoted to properties, aging at elevated temperatures, automatic winding machines, resistance to "Freon" fluorinated refrigerants, weight and stack loss, solderability, etc.

★ ★ ★

Write Room 8012, Du Pont Building, Wilmington 98, Del., for a copy of the bulletin.

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Silver Coated Copper Wire
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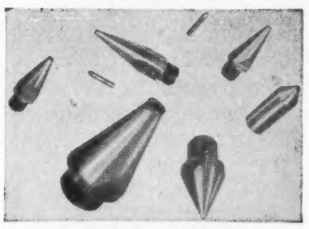
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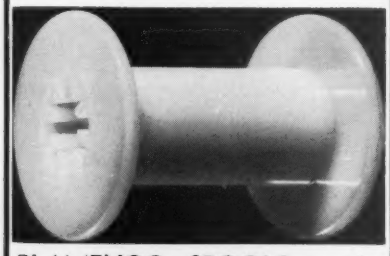
are precision molded of DuPont's Zytel Nylon for more uniform and accurate put-up.



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- Break when dropped.
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Durable and Economical

Get the facts

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The Barbed Wire Story

(*Continued from page* 1002)

a result, Vice President Charles F. Washburn was delegated to investigate facts and conditions with a view to possibly acquiring an active interest in this latest addition to the wire industry.

★ ★ ★

To this end, in March, 1876, Mr. Washburn first visited the Jacob Haish barbed wire factory at DeKalb, Illinois, and sounded the owner in the matter of purchasing patent rights and manufacturing equipment. Yes, Mr. Haish would sell—for $200,000.

★ ★ ★

Washburn promptly withdrew, turning to Glidden & Ellwood of the Barb Fence Company. Many years later Haish stated that had Washburn been a typical Yankee and offered him $25,000, he probably would have accepted it.

★ ★ ★

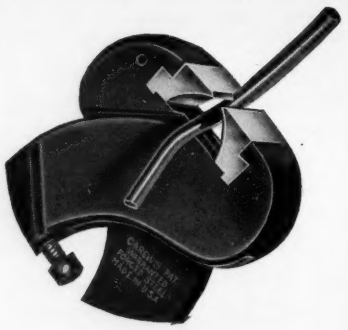
Favorably impressed, Washburn learned that Mr. Glidden, a farmer, was willing to retire from the firm. An agreement was reached whereby (in May, 1876) Washburn & Moen purchased Glidden's half-interest in patents and the Barb Fence Company. The price was $60,000 cash and notes, plus an agreement to pay a royalty on all Glidden barbed wire manufactured by Washburn & Moen or in which they would have an interest. The Barb Fence Company then became the I. L. Ellwood Company, with Charles F. Washburn becoming the silent but by no means inactive partner.

★ ★ ★

By this deal entire control of all J. F. Glidden's patents, as well as all of the other basic barbed wire patents, passed into the hands of Washburn & Moen and I. L. Ellwood. This gave them the legal title to the invention of barbed wire.

★ ★ ★

After Gates "cracked" the market for barbed wire in the Southwest for his Uncle Ike Ellwood, orders rolled in. Within a year production of Ellwood's DeKalb plant



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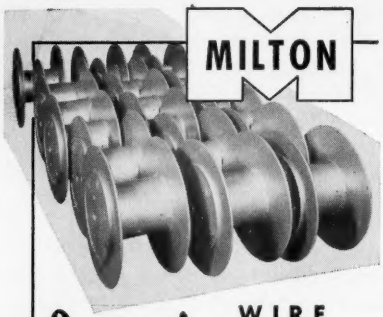

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leaped from 2,840,000 to 12,863,000 pounds of wire and by the second year reached 26,655,000 pounds. Gates felt that in view of this great gain in business he was entitled to a larger commission than Uncle Ike was willing to pay him.

★ ★ ★

Accomplishing no results by letters, Gates finally went to DeKalb for a showdown with his uncle. In a stormy interview, he demanded to be taken in as partner. Uncle Ike, now feeling secure of his market, refused and told Gates that he could remain as a salesman or quit. Gates quit.

★ ★ ★

This marked the end of the era in which barbed wire was developed into a major wire product and the beginning of the era in which Gates really showed his talent as a big time operator.

Wire Flattening

(*Continued from page* 999)

driving pinions directly on to the rolls and so dispense with the universal couplings; this however, has the effect of limiting the roll gap possible according to the depth of the pinion teeth.

Guides

It is necessary to be able to control material being rolled in any fixed position on the roll surface, in order that sections of the working surface of the roll width may be avoided as roll-wear takes place. In addition to this, if the wire line is not carefully controlled, the wire has a tendency to move laterally on the roll surface; which has the effect of producing side bias and dog legs in the rolled product. Without edge rolls the use of guides in keeping the wire free from dog legs is most important but with the use of edging rolls, which to a great degree straighten out dog legs, the primary use of the guides is to keep the wire to its chosen mark.

★ ★ ★

Guides are, therefore, necessary and should be capable of movement

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WOVEN WIRE FABRICS

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13 Rolls Brass 80/20% Wire Cloth, 8 x 8 mesh, .035" diam. of wire, width 24", with two selvedges, each roll 107 running feet.

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IS THE BEST GUIDE . . . TO LOW COSTS.

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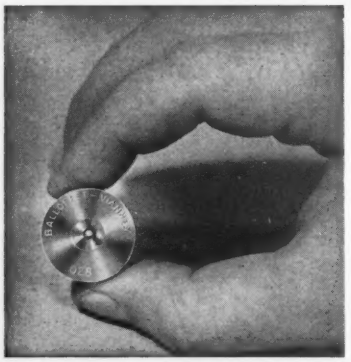

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Quality diamond dies since 1870

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across the whole roll width, they must also, of course, be adjustable in themselves to suit the various wire widths to be rolled. These adjustments should preferably be incorporated with the adjustment of the edging rolls so that both guide and edge roll adjustment is done by one operation, and at the same time the correct setting of the guides for the wire width would be ensured.

Production Planning

With a continuous rolling machine, or a group of machines, capable of a wide range of sizes at varying running speeds, some careful thought must be given to the actual production planning which will form the basis of costing, wage payment and shop loading; and since wire is mainly bought and sold by weight .this should be the basis of the structure. Assuming that all running times are standardized at say 18 minutes and block stripping allowance time is 2 minutes, this gives a cycle of 20 minutes operational time and, carried further, a maximum production of 3 coils per hour per machine, irrespective of variations in coil weight, wire dimensions and running speed. A machine capable of running at 500 to 1,000 FPM would produce coils of 18,000 feet at its maximum speed; the weight of each coil however (and the pounds per minute output) would be governed by the cross sectional area of the wire being produced. If a specific rate of output in pounds per minute is then introduced the cross sectional area of wire which would yield that output can be determined through the following formula:

$$\frac{\text{Lbs. per Minute x Running Time}}{\text{Total Feet x 3.4}}$$

Thus the cross section area (C.S.A.) which would yield 5 pounds per minute would be:

$$\frac{5 \times 18}{18{,}000 \times 3.4} = .00147 \text{ square inch}$$

So it can be seen that all wires with a C.S.A. of .00147 square inch produced at 1,000 F.P.M. with an 18 minute running time will result in coils of 90 lbs. each and the basis of production planning, costing and wage payment will be 5 lbs. per minute or 3 coils of 90 lbs. each per hour per machine. By increasing the lbs. per minute figure from 5 to 6 the cross sectional area will be increased to .00177 square inch and coil weight to 108 lbs. Thus if one wished to standardize output rates at 5, 6 and 10 lbs. per minute, and the running time at 18 minutes per coil, a production chart could be produced to show the C.S.A. which would yield each rate of output at 1,000 F.P.M., 900 F.P.M. and so on down to 500 F.P.M., also the coil weights and rated hourly production (see appendix II). Where the C.S.A. of a job falls between those listed the machine speed would be adjusted to give a constant output at the appropriate level.

★ ★ ★

One can quickly ascertain from the chart that a wire size of say .092" x .016" with a C.S.A. of .00148 square inch would be produced at 1,000 F.P.M. yielding 5 lbs. per minute in coils of 90 lbs. and hourly production of 270 lbs. A wire of .156" x .0315" with a C.S.A. of .0049 square inch would be produced at 600 F.P.M. yielding 10 lbs. per minute in coils of 180 lbs. and hourly production of 540 lbs.

★ ★ ★

The various figures of running time, revs. per minute and coil weights are, of course, chosen only to illustrate the method of production planning and costing and should be treated as such.

Conclusion

In conclusion, the author hopes that this paper will serve as an introduction to a subject on which so little has been written and so much remains to be discovered. Should it either enlighten or stimulate the reader it will have fulfilled the purpose for which it was written.

New Wire Product Described

Every once in awhile, American industry comes up with a new and "better mousetrap" example.

★ ★ ★

The K-Lath Corp., Alhambra, Cal., is making of galvanized wire

and paper, a new product that in five short years has practically revolutionized the plastering industry. In so doing, they have developed new strength for plaster and stucco walls for both commercial buildings and private homes.

★ ★ ★

Designed to carry the same structural principle into reinforced plaster in a manner similar to use of steel reinforcing bars in concrete, K-Lath is an all-purpose backing for inside or outside plastering, utilizing a wire mesh of both 13 gauge and 16 gauge galvanized wire, that will not rip under lateral strains such as those created by an earthquake.

★ ★ ★

Contributing substantially to the expanded availability of this new product for the construction industry is a new Southern California source of supply for galvanized wire. **Bethlehem Pacific Coast Steel Corp.**, at its Los Angeles Plant, recently installed a continuous wire galvanizing facility capable of galvanizing upwards of 40 strands of wire in a complete range of sizes simultaneously.

★ ★ ★

Manufacture of this welded wire grid by K-Lath, which has openings 1½" x 2", is performed on an electronically-controlled electric welding machine. This automatically advances the mesh as the strands are welded, and also shears it to 50-inch lengths. The mesh is 28-inches wide. At the same time, 100-lb. Kraft paper is virtually "stitched" between strands of the 13 gauge wire which runs longitudinally and the 16 gauge which runs transversely. Both wires are drawn from coils on either side of the machine.

★ ★ ★

K-Lath has proven itself in design, engineering, method of manufacture and success in use. Approval by many building and safety agencies, including the Uniform Building Code has been given.

New Testing Machine Announced

A new Lubricant-Friction-Wear Testing Machine has been devel-

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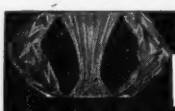
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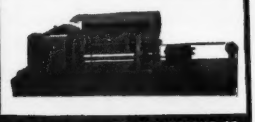
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(*Continued from page* 1020)

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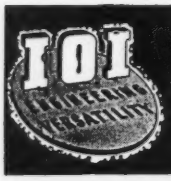

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Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Cold Heading
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit.
Union Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.

DIES—Diamond
Ajax Industrial Supplies, Inc., Ft. Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N.Y.
Union Wire Die Corp., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES DIAMOND—Reversible
National Wire Die Co., New York, N. Y.

DIES—Extrusion
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc, New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Ft. Wayne Wire Die., Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit.
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Union Wire Die Corp., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan. Ill.
Wayne Wire Die Co., Hillside, N. J.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.

DIES—Swaging
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRIVES—Electric, Adjustable Speed
The Louis Allis Company, Milwaukee, Wisc.

DRUMS—Wire Packaging
Continental Can Company, Van Wert, Ohio

DRUMS & TRAVERSES—For Cable Reels
Hubbard Spool Co., Garrett, Ind.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio.

DRYING EQUIPMENT
Carl Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.

ENGINEERS—Consulting
Insulating Mach'y—Entwistle, Jas. L., Co., Cranston, R. I.
Lubricants—Hans C. Bick, Inc., Reading, Pa.
Wire Mill—Clarence S. Arms, Worcester, Mass.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

FREQUENCY CHANGERS
The Louis Allis Company, Milwaukee, Wisc.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Galvanizing Equipment
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating
Ajax Electric Co., Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Rockwell, W. S., Co., Fairfield, Conn.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Resistance Heating, Strand
(See Annealing Machines)

FURNACES—Salt Bath
Ajax Electric Co., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Strand Annealing
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

GAUGES—Wire Diameter, Continuous
Industrial Gauges Corporation, West Englewood, N. J.

GALVANIZING EQUIPMENT — (See MACHINERY—Galvanizing Wire)

GEARMOTORS
The Louis Allis Company, Milwaukee, Wisc.

GRINDERS—Roll
Norton Co., The, Worchester, Mass.

GUIDES—For Wire
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HARDSURFACING ALLOYS—
(See Alloys—Hardsurfacing)

HOOKS—Pickling & Liming
Youngstown Welding & Eng'g' Co., Youngstown, Ohio

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Kellogg Company, M. W., Chemical Manufacturing Division, Jersey City, N. J.

INSULATING MATERIALS—
Celanese Corporation of America, New York, N. Y.
Chemical Products Co., E. Providence, R. I.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Electronic Rubber Co., Stamford, Conn.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Pittsburgh Plate Glass Company, Pittsburgh, Pa.
Plymouth Cordage Company, Plymouth, Mass.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

INSULATING MATERIALS—Paper (For Electric Wire Cable)
Plymouth Cordage Company, Plymouth, Mass.

LACQUERING SYSTEMS — See MACH.—Lacquering Electric Wire

LACQUERS—For Electric Wire
Chemical Products Co., E. Providence, R. I.

LAGGING—Reel
North Anson Reel Co., No. Anson, Me.

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The, Philadelphia and Bellefonte, Pa.

LUBRICANTS — For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Rome Soap Mfg. Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Bick, Hans C., Inc., Reading, Pa.
Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Bobbin Winders
Cedar West Tool Inc., New York, N. Y.
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Braiding
Carter & Co., Ltd., B. & F., Bolton, England.
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding-Wire)

MACHINERY—Chain Making
Nilson, A. H. Machine Co., Bridgeport, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Closing Rope
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Cold Heading
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Coil Wrapping (Paper)
McLaurin-Angier Co., Needham Heights, Mass.

MACHINERY—Copper Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
National Mach'y Exch. (Used), New York.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Wells, Frank L., Co., Kenosha, Wis.

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Herborn, Germany.

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
Metallurgical Products Dept. of General Electric Co., Detroit.
Union Wire Die Corp., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Michigan Oven, Company, Detroit, Mich.
Rockwell Co., W. S., Fairfield, Conn.

MACHINERY—Extruding
Davis-Standard Sales Corp., Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Prodex Corp., Fords, N. J.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.

MACHINERY—Flat Wire
Fenn Manufacturing Co., Newington, Conn.
Mettler Machine Tool, Inc., New Haven, Conn.
Rockwell, W. S., Company, Fairfield, Conn.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming Wire
Baird Machine Co., Stratford, Conn.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle Manufacturing Corporation, Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating Wire
American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Sales Corp., Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia.
Cook Mfg. Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, O.
Michigan Oven Company, Detroit, Mich.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Cedar West Tool Inc., New York, N. Y.
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis.
Entwistle Manufacturing Corporation, Providence, R. I.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Baird Machine Co., The Stratford, Conn.
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Packaging Wire
Coulter & McKenzie Machine Co., Bridgeport, Conn.

MACHINERY—Pickling
Youngstown Welding & Eng'g Co., Youngstown, Ohio.

MACHINERY—Pin Making
Baird Machine Co., The, Stratford, Conn.

MACHINERY—Plating
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury Conn.

MACHINERY—Printing on Electric Wire
Gillies, Duncan M. Co., Inc., Boylston, Mass.

MACHINERY—Pumps for Molten Metal
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Re-Spooling
Emory, Robert J., Co., Newark, N. J.
International Wire Products Corp., Woodside Machinery Division, Midland Park, N. J.
National Mach'y Exch. (Used), New York.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.
Wire Insulating Machinery Inc., Northboro, Mass.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Sales Corp., Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Serving
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Spark Testing
Entwistle, Jas. L., Co., Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Staple
Nilson, A. H. Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Straightening & Cutting
Lewis Machine Co., The, Cleveland, Ohio.
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Geo. C. Patterson Machine Co., Cleveland, Ohio.
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Stranding
Carter & Co., Ltd., B. & F., Bolton, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Swaging
Fenn Manufacturing Co., Newington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out
American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Sales Corp., Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Fenn Manufacturing Co., Newington, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing Magnet Wire Coatings for Pin Holes
Peschel Electronics, Inc., New Rochelle, N. Y.

MACHINERY—Testing, Physical
Scott Testers, Inc., Providence, R. I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Turks Head
Fenn Manufacturing Co., Newington, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—Welded Wire Mesh
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot and Machinery —Welding Wire Fabrics)

MACHINERY—Winding Wire
Emory, Robert J., Newark, N. J.
Fenn Manufacturing Co., Newington, Conn.
Hobbs Manufacturing Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.
Wire Insulating Machinery Inc., Northboro, Mass.

MACHINERY—Wire Drawing
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Fenn Manufacturing Co., Newington, Conn.
Herborn, Herborn, Germany
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Morgan Construction Co., Worcester, Mass.
Morgardshammers Mek Verstads AB, Morgardshammer, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Wire Forming
Baird Machine Co., The, Stratford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
Carter & Co., Ltd., B. & F., Bolton, England.
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
Larmuth (1947) Ltd., Swinton, England
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MOTORS—Electric, A. C. & D. C.
The Louis Allis Company, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio.
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Michigan Oven Company, Detroit, Mich.
Rockwell Co., W. S., Fairfield, Conn.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio.

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAPER—Creped Wrapping
Arkell Safety Bag Company, New York, N. Y.
McLaurin-Angier Co., Needham Heights, Mass.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Arkell Safety Bag Company, New York, N. Y.
McLaurin-Angier Co., Needham Heights, Mass.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—Insulating
Plymouth Cordage Company, Plymouth, Mass.

PATENT ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PICKLING—Hooks, etc. Acid Resisting
Youngstown Welding & Eng'g Co., Youngstown, Ohio.

PLASTICIZERS—
Celanese Corporation of America, New York, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

PLASTICS COMPOUNDING — Custom
Electronic Rubber Company, Stamford, Conn.
Plandex Corporation, Downingtown, Pa.

PLASTICS—for Wire Insulation
Celanese Corporation of America, New York, N. Y.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Electronic Rubber Co., Stamford, Conn.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plandex Corporation, Downingtown, Pa.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

POINTING WIRE
Main, Robert A. & Sons, Inc., Paramus, N. J.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio

PRINTING WHEELS—for Electric Wire
Gillies, Duncan M. Co., Inc. Boylston, Mass.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio

PUMPS—Molten Metal
Fisher Associates, New York, N. Y.

REEL AND TENSION STANDS—
Industrial Ovens, Inc., Cleveland, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio.

REELS—Metal Bound
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
North Anson Reel Co., No. Anson, Me.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L. Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Garrett, Ind.
Mason Can Company, East Providence, R. I.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Co., New York, N. Y.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Mason Can Co., East Providence, R. I.
McCaskie, Inc., William, Westport, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Company, New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
North Anson Reel Co., No. Anson, Me.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
North Anson Reel Co., No. Anson, Me.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Crucible Steel Co. of America, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Chase Brass & Copper Co., Waterbury, Conn.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Titan Metal Manufacturing Co., Bellefonte, Pa.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—Rust Preventing)

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—(See Reels & Spools)

SPOOLS—Braider, Wire
Plastic Mold & Engineering Co., Providence, R. I.

SPOOLS—Stamped Metal for Retail Wire Sales
Clark, J. L. Mfg. Co., Rockford, Ill.
Mason Can Company, East Providence, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS — INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.
Wire Equipment Mfg. Co., Trenton, N. J.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Adjustable Speed Drives)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VARNISHES & LACQUERS—for Electric Wire
Chemical Products Co., E. Providence, R. I.
Shawinigan Resins Corporation, Springfield, Mass.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire Insulating Machinery Inc., Northboro, Mass.

WELDERS—Spot and Butt and Welding Wire Fabrics
Micro Products Co., Chicago, Ill.

WIRE—Aluminum
Alabama Wire Company, Florence, Ala.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass and Bronze
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Bunched & Stranded, Copper
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Camden Wire Co., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Camden Wire Co., Inc., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
United Wire & Supply Corporation, Providence, R. I.

WIRE—For Electrical Conductors
Camden Wire Co., Camden, N. Y.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Flat, Fine
Montgomery Co., The, Windsor Locks, Conn.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
National Standard Company, Niles, Mich.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Manufacturers
Alabama Wire Company, Florence, Ala.
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark, N. J.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.
U. S. Steel Corp., N. Y., N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Metalizing
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
National-Standard Company, Niles, Mich.
Worcester Wire Works Div., National-Standard Company, Worcester, Mass.

WIRE—Needle
Carpenter Steel Company, Webb Wire Division, New Brunswick, N. J.

WIRE—Nickel Alloy
Carpenter Steel Company, Webb Wire Division, New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Malin & Co., The, Cleveland, Ohio
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Oil Tempered
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Pointed
Main, Robert A. & Sons, Inc., Paramus, N.J.

WIRE—Silver Plated Copper
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

WIRE—Special Shapes
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Carpenter Steel Company, Webb Wire Division, New Brunswick, N. J.
Crucible Steel Co. of America, Pittsburgh, Pa.
Firth Sterling, Inc., Pittsburgh, Pa.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
National Lock Washer Company, The, Newark, N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Steel—Also Coppered and Galvanized Steel
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Tinned Copper
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

WIRE—Weaving
Alabama Wire Company, Florence, Ala.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARNS & TAPES—Insulating
Celanese Corporation of America, New York, N. Y.
Pittsburgh Plate Glass Company, Pittsburgh, Pa.

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE AND MASTICATING MACHINERY MANUFACTURERS

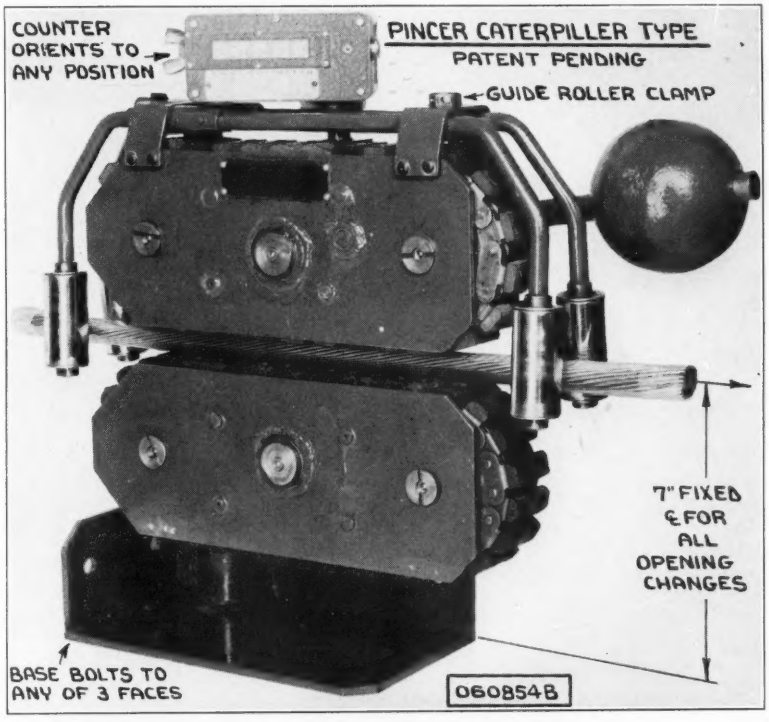
WATSON

CATERPILLAR MEASURING MACHINES

PATENT PENDING.

THESE NEWLY DESIGNED UNITS FULFILL THE LINEAL MEASURING MACHINE REQUIREMENTS OF ACCURACY, VERSATILITY, RUGGEDNESS, COMPACTNESS AND SIMPLICITY OF OPERATION, NOT ONLY FOR SMOOTH SURFACED PRODUCTS, BUT ALSO FOR PRODUCTS OF UNEVEN CONTOUR, SUCH AS, BX CABLE, ROPE, AND CABLED ELECTRICAL CONDUCTORS.

OUTSTANDING FEATURES OF THIS DESIGN ARE THAT WEAR OF TRACK TREAD DOES NOT AFFECT THE ACCURACY OF COUNT AND SINGLE ADJUSTMENT CONTROLS POSITION OF ALL GUIDE ROLLERS.


COUNTER ORIENTS TO ANY POSITION
PINCER CATERPILLER TYPE
PATENT PENDING
GUIDE ROLLER CLAMP
7" FIXED ℄ FOR ALL OPENING CHANGES
BASE BOLTS TO ANY OF 3 FACES
060854B

THREE TYPES AVAILABLE:

PINCER TYPE — **SHOWN BY CUT, SUITABLE FOR MOST APPLICATIONS FOR PRODUCTS TO 2" DIAMETER. CONSTANT BASE TO CENTERLINE HEIGHT FOR ALL OPENINGS ELIMINATE PEDESTAL ADJUSTMENT FOR CENTERING.**

ARM TYPE — **SIMILAR TO PINCER TYPE BUT WITHOUT LOWER TRACK ASSEMBLY FOR USE WITH STIFF PRODUCTS TO 2" DIAMETER. MOUNTED ON A SWIVEL BRACKET TO SWING CLEAR WHEN NOT IN USE.**

TRACK TYPE — **SIMILAR TO ARM TYPE BUT WITHOUT GUIDE ROLLERS MAKE THIS TYPE ESPECIALLY SUITED FOR MEASURING WIDE PRODUCTS SUCH AS FLATS, SHEETS, STRIPS, ETC.**

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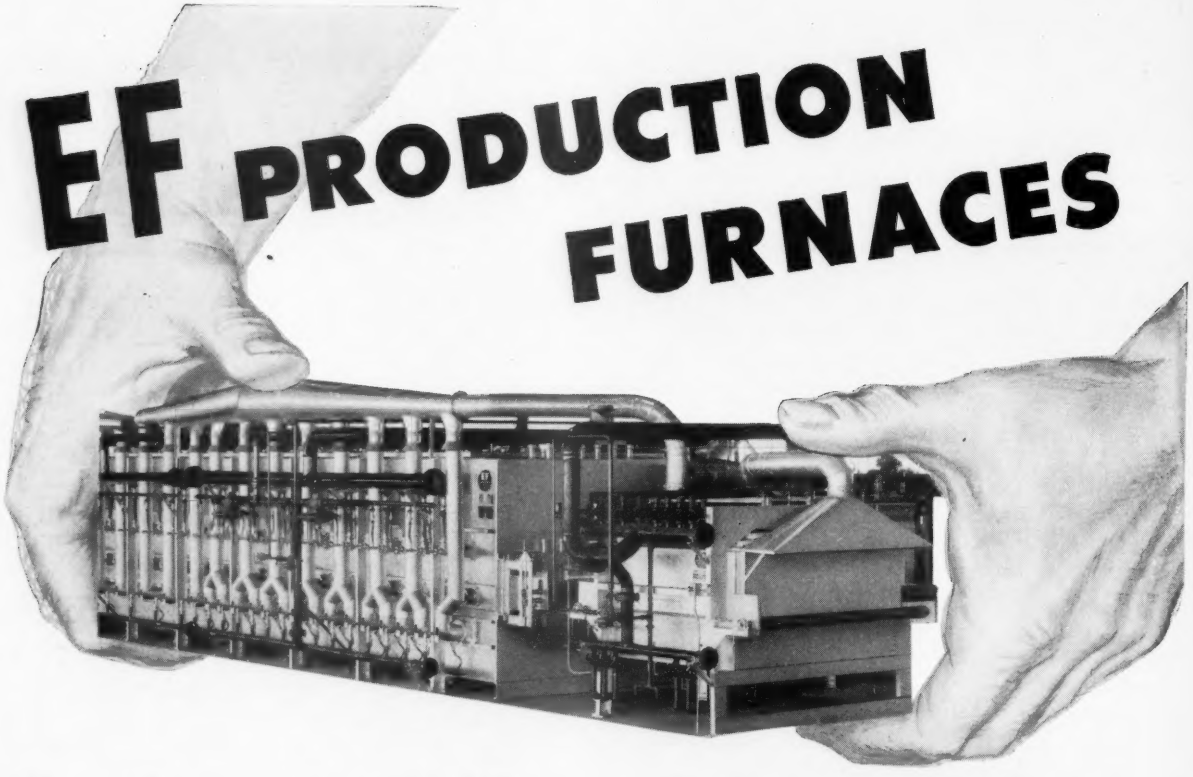
EF PRODUCTION FURNACES

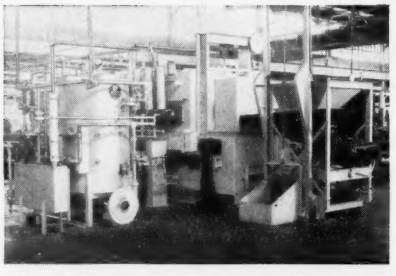


Designed, Built and Installed --- Ready to Produce

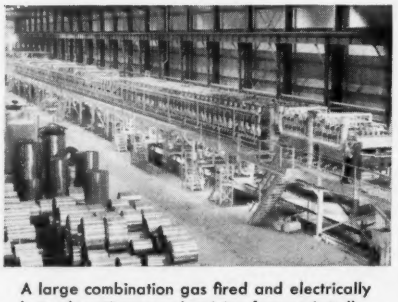
● It costs less to let experienced heat treating furnace engineers handle all phases of your heat processing furnace projects. Then you can be sure the design and type of furnace, the method of heating, the special atmosphere, the material handling and other equipment are all best suited for your particular product and process. All phases will be synchronized and coordinated to your production schedules, simplifying the entire operation and assuring profitable and trouble-free service.

EF engineers have served many of the country's most successful companies, and have handled many complete projects . . . some of extremely confidential nature.

On your next heat processing or furnace project, no matter how large or unusual, take advantage of the extensive experience and complete service offered by EF heat processing engineers — YOU'LL FIND IT PAYS.



A small, complete, compact installation consisting of an EF continuous scale-free hardening and gas carburizing furnace, a special combination Endo and Exo gas generator, automatic feeder, quench and discharge equipment.



A large combination gas fired and electrically heated continuous galvanizing furnace installation (over 300 feet long). As usual this equipment was completed and in production on schedule, and the first coil run thru was accepted as firs' class salable material.

THE ELECTRIC FURNACE CO.

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION

Salem - Ohio

Canadian Associates • Canefco Limited • Toronto 1, Canada